BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

Vol. 28.] 1931. [No. 5.

SLEEPING SICKNESS.

JOHNSON (W. B.). **Notes upon a Journey through Certain Belgian, French and British African Dependencies to observe General Medical Organisation and Methods of Trypanosomiasis Control.**—40 pp. With 21 figs. on 7 plates. 1929. Lagos: Govt. Printer.

The journey upon which this report is based was made primarily with the purpose of encouraging co-operation between workers upon the problems of trypanosomiasis and tsetse fly control.

The author remarks that in Belgian and French territory sleeping sickness is being controlled by the general application of the medical passport system, which involves the medical examination of all persons moving from their own locality. The disease is being gradually diminished in the most heavily infected areas by the repeated examination of the whole population, with treatment of cases by organized brigades. Research upon the efficacy of certain drugs is being carried out at Leopoldville and Brazzaville. Removal of hamlets in fly-infested areas to settlements along main routes is being carried out in certain districts.

In Tanganyika the problem is exceedingly serious owing to the infestation of a large portion of the territory with *G. morsitans* and *G. swynnertoni* and the existence of endemic and epidemic foci of *T. rhodesiense* infection carried by these species. Control is being effected by well-planned concentration of scattered hamlets into cleared settlements, where improved methods of agriculture upon economic lines are being instituted by the agricultural officers attached for this work. Movement of the population in infected areas is controlled by a permit system. Prevention of future epidemics depends upon early notification of fresh local outbreaks, and Johnson considers it doubtful whether the existing medical staff and rural dispensaries are sufficient for this purpose. Experiments with late grass burning are showing encouraging results in certain types of country.

In Uganda certain districts are declared "infected" or "restricted," and in these movement is only allowed upon permit. The shore and islands of Lake Victoria are being repopulated under close supervision. Cases of sleeping sickness are not at present numerous, but close contact between man and fly exists in many districts and any relaxation of the present regulations would probably lead to recrudescence of the

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disease. Fly control consists of localized clearings for the purpose of settlements.

In the Sudan a well-organized and fully staffed campaign has practically eradicated sleeping sickness from the two infected provinces of Mongalla and Bahr el Ghazal. Isolation of patients in treatment camps, removal of villages from fly-infested areas, and control of movements of inhabitants and emigrants have been the measures adopted.

Johnson then passes to certain recommendations for Nigeria. He considers that there is need for a more general examination of the population for sleeping sickness. The work during the past two years has shown that sleeping sickness is widely spread and is causing a disconcerting mortality and depopulation of the Northern Province. Little is known of its range in the Southern Provinces and in the Cameroons. The gravity of the situation has in fact been underestimated. The frontiers bordering French territory require special attention. The existing sleeping sickness staff should receive additional African assistants.

Spread of the disease, which is undoubtedly occurring, should be controlled by declaring certain main endemic centres " infected areas." In these districts labour recruiting should not be allowed or allowed only under medical supervision ; no movement of inhabitants should be allowed without permits. No enterprises entailing employment of labour in such districts should be allowed unless an adequate medical staff is available. Provision should be made for compulsory treatment of patients, if necessary, and also for removal of villages into fly-free areas if such is deemed advisable.

Certain recommendations follow regarding the sleeping sickness staff necessary. Research upon the resistance of man and animals to trypanosome infection should be continued and the scientific staff should be maintained and include pathologists and a biochemist. Co-operation with other workers in Africa should be maintained by interchange of reports and by exchange of visits.

Johnson believes that much valuable information concerning tsetse fly belts in relation to vegetation belts could be obtained by aerial survey of the country, and he hopes that if such a survey be undertaken by the Survey or Forestry Departments special provision will be made for the requirements of the Tsetse Investigation.

W. Yorke.

MACLEAN (G.). **A Report on Human Trypanosomiasis in Tanganyika Territory for the Year ending 31st December, 1929.**—*Tanganyika Territory Ann. Med. & San. Rep. for the Year ending 31st December, 1929.* IX. Scientific. pp. 132–140.

No extension of human trypanosomiasis to other parts of the Tanganyika Territory was observed during the year 1929, nor was any evidence obtained of any local increase of epidemic proportions.

Kahama district now forms the chief centre of infection, the number of new cases having more than doubled. Next come Tabora and Nzega districts, where there has been an increase of 75 per cent. over last year's cases. There follows a discussion of the situation in the various sleeping sickness districts of the territory. This calls for no special notice.

W. Y.

MACLEAN (G.). **Sleeping Sickness Measures in Tanganyika Territory.**—*Kenya & East African Med. Jl.* 1930. Aug. Vol. 7. No. 5. pp. 120–126.

In this short article the author summarizes the measures which are being directed against Rhodesian sleeping sickness, which is the type now prevalent in Tanganyika Territory.

Method 1. This consists in establishing treatment centres in suitable places, while the homes of the people are not interfered with. It is in force in Ikoma, Mwanza Province, where most of the people have permanent homes in open country and visit the forest from time to time to hunt or fish.

Method 2. This consists in clearing bush around existing villages and frequented places. It is a valuable method in a delimited area where supervision can be maintained and was put into practice with success at Lukiliro, Lindi Province, in 1925–26.

Method 3. This consists in concentrating and consolidating a scattered population into a large community within the forest. Settlements of not less than 1,000 people are aimed at and provided the site is suitable the bigger the population the greater the prospects of success. There are several now in existence in Kigoma and Tabora Provinces with populations of over 3,000 persons.

Method 4. This is the same as *Method 3* except that when the clearing is made the new settlement borders on open country ; an extreme form of it is to make the settlement quite outside the forest.

The last two measures are those now generally adopted in Tanganyika. Their adoption necessarily implies the introduction of certain agricultural measures which are discussed by the author in some detail.

W. Y.

MAURICE (G. K.). **Sleeping Sickness.**—*Rep. on Med. & Health Work in the Sudan for Year 1929.* pp. 26–36.

After stating that during the year 1929 the sleeping sickness admissions for the whole of the Sudan were 20, 18 in Tembura district and 2 in Yambio, the author passes to a brief review of the work done in the Sudan during the past twenty years.

The following summary is given :—

" Measures taken in time shut out infection from two districts of Bahr El Ghazal whose combined area is seven times as large as Wales.

" Where the disease obtained a footing in Yei District of Mongalla Province, an adequate staff was able to bring a considerable epidemic under control in the space of two years, but further east the disease lingered because the staff was depleted.

" In Tembura District of Bahr El Ghazal where a serious epidemic became established, an inadequate staff could not in four years even arrest the spread of the disease, but when an adequate medical and administrative staff was provided, and the habits of the people changed, the epidemic was controlled within three years and the disease almost eradicated in the space of six.

" The maintenance of fly-free streams was aided by the planting of Cynodon transvaalensis.'

" The habits of the people were transformed without causing resentment.

" Segregation was best effected in a Settlement where patients lived with their relatives, growing their own crops around homesteads of their own, and thereby becoming self-supporting in the space of two years."

W. Y.

BOUFFARD (G.). La trypanosomiase humaine en Côte d'Ivoire. [**Sleeping Sickness in the Ivory Coast.**]—*Bull. Soc. Path. Exot.* 1930. Nov. 12. Vol. 23. No. 9. pp. 922–927.

The recent discovery of two severe cases of trypanosomiasis among Europeans—one contracted in the lower part of the Ivory Coast almost on the coast, and the other 600 km. from the coast—has caused the author to review the state of knowledge regarding the presence of sleeping sickness in the Ivory Coast.

The endemic foci of the Upper Ivory Coast have been known for more than 30 years. BOYÉ in 1897 observed cases of clinical sleeping sickness in the regions of Odienné and of Man. BOUET in 1908 found two microscopically positive cases at Bouaké, two at Korogho, two at Touba and one at Odienné. The foci constituted a serious menace in such densely populated districts, and a hospital was created at Korogho where cases were isolated and treated. When the author was appointed director of sanitary services in 1924, the hospital no longer existed and cases of sleeping sickness were apparently exceedingly rare. The situation remained stationary up to 1929.

The foci in the Lower Ivory Coast are of more recent knowledge. The researches of BOUET in 1906 and 1908 were without result. The few cases found later were believed to have contracted the disease in the upper territories. It was not until 1913 that the first autochthonous case was found. BOUET then examined 665 inhabitants of Bingerville and district, but found only a single case. Glossina are very common in the Lower Ivory Coast and BOUET examined 458 caught at Bingerville and found only 12 infected with animal trypanosomes and none with *T. gambiense.* The records since 1914 are scanty. BLANCHARD never saw a suspicious case during his long stay at Bassam. BAUVALLET in 1921 examined 7,000 persons without finding a case of the disease and none have been recorded between 1924 and 1929.

At Abidjan, the most important place in the Colony, there is a large hospital where about 400 people are examined daily. Between 1924 and 1929, 11 cases of sleeping sickness have been seen. Certain of these came from the Upper Coast, the others from the regions of Abidjan and Bingerville. The author has examined the population of the three villages from whence these cases came without finding any more.

The paper concludes with a discussion concerning the explanation of this curiously scattered, purely endemic, nature of sleeping sickness in the Ivory Coast.

W. Y.

BOYÉ. La prophylaxie de la trypanosomiase en Afrique Equatoriale Française. [**Prophylaxis of Trypanosomiasis in French Equatorial Africa.**]—*Bull. Office Internat. d' Hyg. Publique.* 1930. Oct. Vol. 22. No. 10. pp. 1927–1944. [2 refs.]

A general account is given of the anti-trypanosomiasis campaign which is being conducted in French Equatorial Africa. At the beginning of 1929, 18 doctors, 19 sanitarians and 150 skilled native assistants were employed on this work. As the result of the new organization outlined in 1930 the medical personnel will exceed 33 (21 French and 12 foreign). In addition all the other medical men in the posts will contribute to the work, just as those specially engaged in sleeping sickness work will concern themselves with improving the

general hygiene of the populations visited. (The vaccination of the natives is an especially beneficial measure. The vaccinations are always done with dry vaccine which preserves its virulence for many months without special precautions.)

In 1928 the number of persons visited was 517,168 and that of old cases of trypanosomiasis treated was 15,423; the number of new cases discovered was 5,735.

A brief summary is given of the therapeutic results obtained with atoxyl, tryparsamide, "Fourneau 270" and "Fourneau 309" ("Bayer 205").

W. Y.

DE MARQUEISSAC. Note sur le fonctionnement du centre médical d'Ayos, de mars 1922 à août 1929. [**The Work of the Medical Centre of Ayos, Cameroon, from March 1922 to August 1929.**]—*Ann. de Méd. et de Pharm. Colon.* 1930. July–Aug.–Sept. Vol. 29. No. 3. pp. 396–407.

Ayos is on the River Nyong in the heart of the sleeping sickness district of Cameroon. The centre was created by the Germans in 1912, and reopened by the French in 1920. It is now a research centre, a school of *infirmiers*, and a centre of public assistance. All natives who apply for treatment are examined for trypanosomiasis by gland palpation and puncture, and blood microscopy. In doubtful cases lumbar puncture is done. In January–July 1929, 188 punctures were made on natives negative by other methods, and in 92 cases, or nearly half, trypanosomes were found in the C.S.F. The obligatory examination of all sick natives between 1922 and 1929 has affected 78,595 persons; 17,205 *or 22 per cent. have been recognized as infected with trypanosomes.* The numbers year by year are given in a table. Since 1924 all the boatmen on the river have been examined yearly; 1,161 cases have been thus detected, and the index of infection, at first 9·4 per cent., has been reduced to 0·9 per cent. In the course of the 8 years 177,941 sleeping sickness patients have been treated as out-patients at Ayos, and 6,763 as hospital patients. The period of detention of the latter is about 70 days (10 injections of tryparsamide at 7–day intervals). None except mental cases are detained against their will and no one is compelled to return home, for advanced sleeping sickness patients would be abandoned. In the last 12 months 18,000 subcutaneous injections of tryparsamide have been given, all by native *infirmiers.* Between September 1928 and July 1929, 144 infirmier-pupils were admitted to the school.

Figures are also given of the number of persons treated for yaws (17,000) and syphilis (99,000).

A. G. B.

LEAGUE OF NATIONS. Health Organisation. **Investigations on Human Trypanosomiasis in Mozambique. Report submitted to the Second International Conference on Sleeping-Sickness (Paris, November 5th to 7th, 1928)** [KOPKE (Ayres)]. L.o.N.P. 1930. III. 12.—31 pp. With 1 map. Geneva.

At the International Congress on Tropical Medicine held at Loanda in 1923, Kopke proposed that a medical mission should be sent to Mozambique. For various reasons it was not until July 5th, 1927,

that the mission reached Mandimba; as the delegates from Lisbon had to be back on April 1st, 1928, there was a period of only 7½ months in which to work. It was decided to concentrate in the Nyasa Company's territory around Metarica, where cases of sleeping sickness had occurred among the Europeans.

An account of the itinerary of the mission is given in detail. It calls for no special notice. The next portion of the report deals with a proposal for the enlargement of the Central Laboratory at Lourenço Marques and its conversion into a medical research institute.

W. Y.

DUKE (H. Lyndhurst). **The Discovery of *T. rhodesiense* in Man in the Uganda Protectorate.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. Aug. 8. Vol. 24. No. 2. pp. 201–218. With 1 map in text. [9 refs.]

With the object of studying the development of arsenic resistance in *T. gambiense* and the persistence of this character when the strain is transmitted through tsetse to another host, an appeal was made to Medical Officers in the West Nile area for persons in whom the infection was apparently resistant to arsenic. As the result of this appeal three cases were sent to the laboratory hospital. Each of these patients was given three doses of 2 to 3 gm. of tryparsamide at weekly intervals and blood examinations made daily showed the persistence of trypanosomes. The patients were then treated with Bayer with an immediate beneficial result. Before commencing treatment all three strains were secured in monkeys by blood inoculation and by laboratory-bred *G. palpalis* fed on the patients. Two of the strains behaved like typical *gambiense* save for their resistance to arsenic. One of them, "Okero," exhibited differences and is the subject of this paper. A chart is given showing the passage of this strain through monkeys and guineapigs. The tests applied to differentiate the "Okero" strain from *T. gambiense* were:—

1. Virulence in laboratory-bred animals.
2. Reaction to drugs.
3. The occurrence of posterior-nuclear forms.
4. The adhesion-test.

1. *Virulence in laboratory-bred animals.*

The virulence was examined in monkeys, guineapigs, and white rats, and the results are summarized in a table from which it is seen the average duration was in the monkey 30 days, in the guineapig 30 days, and in the rat 20 days.

2. *Reaction to drugs.*

Before leaving his home, the patient, Okero, had been given seven injections of trypanarsyl. It was his failure to respond to this treatment that led to his selection and dispatch to Entebbe as an "arsenic-resistant" case. After arrival at Entebbe he was, as already mentioned, given three further injections of tryparsamide without result and recourse was consequently had to Bayer 205. In fact, with the "Okero" strain or with the laboratory strain of *T. rhodesiense* in guineapigs, it was found that doses of ·03 gm. per kilo of atoxyl failed to cause the disappearance of trypanosomes, whereas guineapigs infected with *T. gambiense* were sometimes sterilized by a single dose of ·01 per kilo.

3. *The occurrence of posterior-nuclear forms.*

These were found frequently and in considerable numbers in the blood of infected rats.

4. *Adhesion-test.*

It is shown in tables that Okero's blood reacted on occasion with both *T. gambiense* and *T. rhodesiense*, but the most striking and regular response was with his own strain of trypanosomes. Conversely, Okero's strain of trypanosomes reacted with the blood of animals infected with *T. gambiense*, *T. rhodesiense*, or strain "Okero," with Okero's own blood, and once with the blood of another of the three cases sent from the White Nile area who was infected with a strain diagnosed provisionally as arsenic-resistant *T. gambiense*.

Experiments showed that the "Okero" strain was able to develop in *G. palpalis* and that both gut and salivary gland infections occurred. Of 261 flies used in this work, 1·5 per cent. developed gland infections.

The article concludes with an interesting discussion which should be consulted in the original.

W. Y.

DUKE (H. Lyndhurst). **On the Occurrence in Man of Strains of** *T. gambiense* **Non-transmissible Cyclically by** *G. palpalis.—Parasitology.* 1930. Oct. Vol. 22. No. 4. pp. 490–504. [9 refs.] [Human Trypanosomiasis Inst., Entebbe, Uganda.]

This paper is called forth by certain criticisms made by the reviewer in his summary of the author's article on "The Bionomics of the Polymorphic Trypanosomes of Man and Ruminants," which appeared in the Final Report of the League of Nations International Commission on Human Trypanosomiasis. The particular criticism dealt with is that the reviewer considered that the number of flies employed by Duke was too small to warrant the important inference that 4 of the 12 strains studied in the human subject were non-transmissible cyclically by laboratory-bred *G. palpalis* [this *Bulletin*, Vol. 25, p. 759].

TABLE.

Animal.	Date.	Total flies dissected.	Total infected flies.	Percentage of infected flies.	No. of infected flies alive at 25th day.		Percentage of gland infections.	Transmissibility index.	Total.
					With glands infected.	Total.			
M 507	3–19.ii.29	226	8	3·5	0	7	0	0	1,543
	5–24.iii.29	385	9	2·3	0	7	0	0	
	19.v.–11.vi.29	483	9	1·8	0	6	0	0	
	22.vi.–11.viii.29	449	3	0·6	0	2	0	0	
M 506	23.iii.–18.iv.29	343	4	1·1	0	3	0	0	858
	19.v.–11.vi.29	515	5	0·9	0	5	0	0	
M 606	14.x.–14.xi.29	456	6	1·3	0	4	0	0	—
M 547	22.v.–21.vi.29	430	10	2·3	0	8	0	0	—
M 601	24.ix.–14.x.29	425	6	1·4	0	3	0	0	—
M 607	15.x.–11.xi.29	375	6	1·6	0	5	0	0	900
	19–31.xii.29	525	0	0	0	0	0	0	

Duke, after welcoming such criticism of the "admitted weakness" of his case, set himself to collect more data with the object of further testing the accuracy of his contention.

The first strain dealt with was isolated from a European. A detailed history of the case is given, from which it appears that the patient had been infected either two years, or approximately 12 months, according to whether he was infected in the West Nile Area in 1927 or near Kampala early in 1928. By September, 1928, somnolence was a definite symptom, and Duke believes that in view of this it is probable that the infection actually occurred early in 1927. The patient had been untreated save for a course of stovarsol and two injections of N.A.B. in October, 1928. The strain was isolated on January 18th, 1929, by subcutaneous inoculation of 10 cc. of the patient's citrated blood. The subsequent history of the strain through six monkeys is shown in a table, and in Table 2, which is here reproduced, details are given of the fly experiments performed upon this strain and its infectivity to *G. palpalis* in different animal passages. From this table the following points of interest emerge :—

"(1) Wherever more than one test was applied to a monkey the percentage of infected flies diminished in each successive test.

"(2) Of a total of 66 infected flies, 50, i.e. 75 per cent., lived 25 days or more : this high percentage of survivors greatly enhances the value of the investigation.

"(3) The percentage of infected flies in the *first* tests on each animal is fairly constant. Of the 2,255 flies employed in all these first tests 40, i.e. 1·7 per cent., were infected ; and of these 40 flies, 30, i.e. 75 per cent., lived 25 days or longer.

"In the course of these experiments 4,612 flies were fed upon animals infected with this European strain ; 66 flies developed massive gut infections, but in none were the salivary glands infected ; 75 per cent. of the infected flies lived 25 days or longer."

Details are next given regarding experiments performed with three other strains of *T. gambiense* which proved to be non-transmissible. These are as follows :—Strain Odira obtained from a native in the West Nile District of Uganda 10 days before he died of sleeping sickness ; Strain Pio also from a patient in the West Nile Area and isolated 18 days before death ; and Strain Eli from a patient in the West Nile area who had been sent to Entebbe on account of his failure to respond to treatment with a full course of tryparsamide. After isolation of the last strain by inoculation of the patient's blood into a monkey, Bayer 205 was given with the result that trypanosomes immediately disappeared from the blood and glands.

In the opinion of Duke, it is the prolonged struggle between the mammal and the trypanosome which results in the loss by the parasite of transmissibility by tsetse. A chronic but steadily progressive disease is, he thinks, most likely to produce this result. He remarks, however, that even in the final stages of a long-standing infection, as judged by the alteration of the cerebrospinal fluid, a strain does not always lose its transmissibility.

Details are given of experiments which show that another strain isolated from a man shortly before death was still transmissible.

The presentation of the data above summarized is followed by a theoretical discussion regarding its explanation and significance.

The following are the conclusions :—

"1. Evidence is submitted that strains of *T. gambiense*, non-transmissible by *G. palpalis*, occur in man in nature in regions where *G. palpalis* is the normal vector of this trypanosome.

"2. Such strains may be still infective to tsetse, but cannot invade the salivary glands of the fly.

"3. The application of successive tests to one and the same animal supplies further evidence that the infectivity of a strain to fly is liable to diminish as the disease in the animal progresses towards a fatal termination."

W. Y.

FISCHER (Odön). Humorale Veränderungen bei einem Falle von Trypanosomiasis. (Ein Beitrag zur Autoantikörperfrage.) [**Humoral Changes in a Case of Trypanosomiasis.**]—*Klin. Woch.* 1930. Dec. 27. Vol. 9. No. 52. pp. 2436–2438. [9 refs.] [Psychiat. & Nerve Clinic, Univ., Breslau.]

The clinical history is given of a patient—a European aged 43 years—who, in 1914, suffered from malaria and blackwater fever in the Cameroons ; in 1925 he again had malaria. In the autumn of 1928 he developed sleeping sickness and was treated with germanin, the acute symptoms lasting four weeks. On his return voyage to Africa in autumn 1929 he developed delusions of grandeur and other symptoms suggestive of general paralysis, and had to return to Europe for further treatment. The further details of the case record the development of pulmonary tuberculosis.

The history raises the question whether the mental disturbances were due to syphilis—a history of which was denied—or to tropical malaria or sleeping sickness. With a view to throwing light on the subject the author undertook a number of serological tests and examinations of the blood and spinal fluid.

Microscopic examinations of the blood were invariably negative : the differential blood count showed 11 per cent. of eosinophils and the Arneth count a definite shift to the left. Coverslip preparations of fresh blood showed pronounced autoagglutination of the red cells. Tests for the cold haemolysin were negative.

A number of experiments were conducted with the serum of the patient and of various cases of tabes and general paralysis to ascertain what complement-binding antibodies were present. The serum of the patient gave negative results with cholesterin, ox heart, and with an alcoholic acetone extract of human brain, but a strongly positive result with an alcoholic acetone extract of human red cells of Group O. The syphilitic cases gave positive results with the first two and negative with the third.

Examination of the spinal fluid failed to reveal the presence of trypanosomes. The cell count varied from 37 to 136, and the albumen was increased. The Wassermann reaction was once positive and once negative.

The paper closes with a discussion of the difficulties of diagnosis.

W. Y.

CODVELLE, JAUSION & DUTREY. Un cas de trypanosomiase à forme mégalosplénique. [**Case of Trypanosomiasis with Large Spleen.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1930. Nov. 10. 3rd Ser. Vol. 46. No. 29. pp. 1573–1577.

An account is given of a case of sleeping sickness in a European who had returned to France from the Ivory Coast. The authors record that the chief feature of note was the exceptional size of the spleen, which led to an error of diagnosis. The splenomegaly of trypanosomiasis is, as a rule, very moderate and when pronounced suggests malaria, but this infection was excluded in the present instance. W. Y.

YORKE (Warrington) & MURGATROYD (F.). **Studies in Chemotherapy. III. The Action *in Vitro* of Certain Arsenical and Antimonial Compounds on *T. rhodesiense* and on Atoxyl- and Acriflavine-Resistant Strains of this Parasite.**—*Ann. Trop. Med. & Parasit.* 1930. Oct. 22. Vol. 24. No. 3. pp. 449–476. [26 refs.]

In the first paper of this series the authors, with ADAMS, showed that the action of drugs on trypanosomes could be studied *in vitro* provided that serum of rabbit, ox, sheep, horse or pig was used as supporting medium, whereby the trypanosomes are kept alive for at least 24 hours at 37° C. ; the concentration of the parasites must not exceed a certain level [this *Bulletin*, Vol. 27, p. 237]. In the 2nd paper they showed by this method that *in vitro* as well as *in vivo* human serum and plasma destroy *T. rhodesiense* but spare *T. gambiense* [loc. cit. p. 804] and on this observation found an interesting hypothesis of the epidemiology of human trypanosomiasis. In the present paper they reach chemotherapy proper.

The following is the summary of their paper :—

" 1. As a preliminary step in an investigation designed with the object of throwing light on the mechanism of their curative action in the infected animal, the trypanocidal action of a number of preparations of arsenic and antimony was examined *in vitro*.

" 2. The compounds employed were atoxyl, arsacetin, tryparsamide, stovarsol, halarsol, halarsol thioglycollate, *p*-amino-phenylarsenoxide, reduced atoxyl thioglycollate, reduced arsacetin, reduced tryparsamide thioglycollate, reduced stovarsol thioglycollate, novarsenobillon, arsenophenylglycine, arsenophenylglycineamide, sodium arsenite, stibenyl, stibosan, potassium antimony tartrate, phenol, aniline, and acriflavine.

" 3. The trypanocidal action *in vitro* of these drugs was examined on a normal strain of *T. rhodesiense* and on atoxyl- and acriflavine-resistant varieties of this parasite.

" 4. With the normal strain of trypanosomes it was found that the organic pentavalent compounds are but slightly trypanocidal, a solution of 1 : 1,600 being required to destroy the parasites within 24 hours. Aniline and phenol were several times more active. The organic trivalent arsenical compounds are extraordinarily trypanocidal, even when diluted several hundred million times they killed the trypanosomes within 24 hours ; this also applies in the case of the arsenobenzols—novarsenobillon and arsenophenylglycineamide—but arsenophenylglycine, although very active, is much less so than the other arsenobenzols, a solution of 1 : 3,200,000 being required to destroy the trypanosomes in 24 hours. Sodium arsenite and tartar-emetic likewise displayed considerable action, the corresponding trypanocidal titres being respectively 1 : 3,200,000 and 1 : 6,400,000.

" 5. The response of each of the two resistant strains to the various compounds, although frequently very different from that of the normal strain, proved in every case to be exactly similar to one another. The resistant strains were but slightly more resistant to the pentavalent arsenicals and to aniline than was the normal strain, withstanding as a rule about twice the concentration of drug as did the latter strain. But to the various trivalent arsenicals and arsenobenzols the resistant strains exhibited extraordinarily different degrees of resistance, e.g., to reduced atoxyl thioglycollate, *p*-aminophenylarsenoxide and arsenophenylglycine, they were only about 4 or 8 times as resistant as was the normal strain, whereas to arsenophenylglycineamide and to reduced tryparsamide thioglycollate they were no less than 256 to 1,024 times as resistant as was the normal strain. To sodium arsenite and to tartar-emetic the resistant strains proved to be just as susceptible as did the normal strain.

"6. From these facts the following deductions are drawn :—

(i) The trypanocidal activity *in vitro* of the organic trivalent arsenicals, of the arsenobenzols, of sodium arsenite, tartar-emetic and acriflavine is such as to warrant the conclusion that their therapeutic activity in the infected vertebrate requires no other explanation than that it is solely due to the direct action of the drug on the parasite. The action of the organic pentavalent arsenical and antimonial compounds is so slight as to render such an explanation of their therapeutic activity untenable. A reasonable explanation of their therapeutic value appears to be that they are reduced in the body of the host to the corresponding trivalent compounds.

(ii) The term '*arsenic resistance*' as applied to atoxyl-resistant and acriflavine-resistant strains is a definite misnomer. These strains are not arsenic resistant, but resistant to various organic compounds of arsenic. The similarity of the behaviour of the two strains made resistant to atoxyl and acriflavine respectively, the varying degree of resistance which they exhibit to the different organic compounds of arsenic, and the fact that they are just as susceptible to sodium arsenite as is the normal strain, all indicate in the clearest possible manner that the resistance of these strains is not to arsenic, but to the substituted phenyl radical."

The authors point out that while the injection of drugs into trypanosome-infected animals affords information of their trypanocidal activity, none is afforded of the mechanism of their action, whether it is direct or indirect. Hitherto the results of *in vitro* experiments have been conflicting and of doubtful value, as is shown by a review of the published papers, because the experimental conditions were faulty. Papamarku seems to have been the first to devise satisfactory conditions [loc. cit. Vol. 24, p. 964]. The medium used in this work consisted of equal parts of sheep or rabbit serum and Ringer solution containing 0·2 per cent. of glucose, the serum being heated to 62°–63° C. for half an hour before the addition of the Ringer-glucose solution, and the observations were made for at least 24 hours at 37° C.

An early result of the experiments was the discovery that the character of drug resistance is inherent in the parasites themselves and not, as has often been assumed, dependent on the host. Another finding was that the serum used in the medium is an important factor in determining the exact trypanocidal value of a drug. With media made from certain sera contact with the drug for 24 to 48 hours greatly reduces the trypanocidal value. The conditions were therefore standardized. For these and other details the paper must be consulted. Two pages of graphic formulae of the compounds studied are a useful feature of the paper.

A. G. B.

Sicé (A.). Remarques sur les conceptions actuelles du traitement de la trypanosomiase humaine. [**Present Ideas of Treatment of Human Trypanosomiasis.**]—*Bull. Soc. Path. Exot.* 1930. July 9. Vol. 23. No. 7. pp. 721–724. [6 refs.] [Pasteur Inst., Brazzaville.]

There is now no doubt that atoxyl, alone or associated with emetic, is very efficacious in the treatment of sleeping sickness provided the cerebrospinal system is intact (less than 10 cells per cmm., and 0·15 to 0·20 gm. of albumin per litre). Any sign of involvement of the cerebrospinal nervous system is a contra-indication to the use of

atoxyl and emetic. Details are given of a couple of cases cured by two injections of atoxyl.

The indications for "270 Fourneau" are more extensive. It is a powerful trypanocide in the first stage of the disease, and efficacious in the second stage. A case is cited showing the action of a single injection of "270 Fourneau" in a case of sleeping sickness.

In the second stage of the disease tryparsamide has very great curative powers, as, in a less degree, have also "73" (etharsanol), "134," "139," and especially "175," which is very close to tryparsamide and has given at Brazzaville very definite amelioration. The arsenobenzols have at Brazzaville given only mediocre results.

There are cases—fortunately rare—in which the disease continues to progress notwithstanding efficient and uninterrupted treatment with tryponarsyl or tryparsamide; the drug may prolong life, but fails to cure. The causes of these failures are complex, e.g., old lesions, very active virus, etc. In such cases it is necessary to abandon arsenicals and the author has tried bismuth salts on a number of patients. Unfortunately, the natives readily develop stomatitis and require careful observation; the results, although inconstant, have not been bad.

Of "Bayer 205" and moranyl the author has not had sufficient experience to write with authority. He is not able to confirm BARLOVATZ regarding the value of emetic in patients in the second stage, nor did he find intravenous injections of 4 cgm. per kilo. of sodium salicylate every 7 days to be of any use.

In conclusion, Sicé writes that notwithstanding what we have learned about sleeping sickness much remains unknown. He believes that it is imprudent, if not dangerous, to lay down a standard treatment or "standard-cure" as does MURAZ [this *Bulletin*, Vol. 27, p. 814]. He believes that each patient must be treated as an individual.

W. Y.

MURAZ (G.). A propos de la "cure-standard" appliquée, en Afrique Equatoriale Française, aux trypanosomés. [**The "Standard Cure" of Sleeping Sickness in French Equatorial Africa.**]—*Bull. Soc. Path. Exot.* 1930. Nov. 12. Vol. 23. No. 9. pp. 917–922. [3 refs.]

The author takes exception to SICÉ's remarks regarding his "standard-cure," i.e., 12 injections of atoxyl. He points out that he does not regard this course of injections as an ideal treatment, but rather one necessarily imposed by the conditions of work in French Equatorial Africa, which are briefly summarized.

W. Y.

LEGER (Marcel). Trypanosomiase humaine méningée et tryparsamide. [**Human Trypanosomiasis with Mental Symptoms and Tryparsamide.**]—*Bull. Soc. Path. Exot.* 1930. Nov. 12. Vol. 23. No. 9. pp. 950–958. [1 ref.]

A lengthy account is given of two cases of sleeping sickness. Both patients at the time they were seen by the author—and a correct diagnosis made for the first time—exhibited mental disturbances. These were, however, of quite different nature; the one assumed the form of attacks of delirium during the febrile periods, the other presented the picture of neurasthenia seen in the prodromal period

of general paralysis. The former patient had frequent attacks of fever and was in a state of great emaciation and very poor physical condition, whilst the latter, except at the commencement of the disease, had no fever and was but slightly emaciated.

The author does not desire to labour these different cerebral types of the disease which have already been noted by MARTIN and his collaborators, but he wishes to draw attention to their early appearance; in both cases the duration of the disease was not more than one year.

The results obtained from treatment with tryparsamide were marvellous, and are described in some detail. An interesting point is that one of the patients developed visual troubles during treatment. These were haziness of vision and pronounced contraction of the field. If the case had been less grave treatment would have been suspended, but in view of the circumstances it was decided to continue and the result was completely successful. The observations made on this case also showed that tryparsamide must be given in a long series of doses. Seven or ten weekly doses of a total quantity of 11·5 gm. and 27 gm. were not sufficient, fever and blood relapse being noted 14 days after the first course and 22 days after the second. These facts do not indicate drug resistance on the part of the trypanosome, for the parasites immediately disappeared on further treatment, but that there were certain regions where the parasites were sheltered from the action of the drug ("de terrains vagues" of VERNES).

W. Y.

LAUTERBURG (M.). Zur Frage der Dosierung von Tryparsamid. [**On the Dosage of Tryparsamide.**]—*Schweiz. Med. Woch.* 1930. Dec. 20. pp. 1204–1206. [9 refs.]

Reference is made to a previous paper [this *Bulletin*, Vol. 26, p. 707] in which it is recorded that amongst 27 cases of sleeping sickness, in the second or third stages of the disease, 26 per cent. developed slight visual disturbance, 14·8 per cent. more serious trouble, and 7·4 per cent. blindness. All the patients had received weekly doses of 2 to 3 gm. of tryparsamide. Advanced cases of the disease are much more prone to develop visual troubles than early cases and must accordingly be treated with caution; even early cases, however, may suffer from transient visual disturbance. After the first two or three injections many patients experience a mistiness of vision and see bright sparks. Such symptoms are an indication for caution. Objective signs of eye damage are not manifest early enough to enable one to prevent with certainty complete blindness developing. The fundus remains apparently normal for a long time and pallor of the disc sets in quite late. The single dangerous sign observed is narrowing of the fields of vision and even this sign is sometimes too late.

These facts led the author to consider whether decreasing the dose of the drug might not lessen the danger of eye trouble without interfering with its therapeutic action. A stimulus to this research was provided by a patient who became blind and was cured of sleeping sickness after only 7 gm. of tryparsamide given in doses of 2 gm. and 3 gm.

The author states that he has often noticed that a sleeping sickness patient shows an exaggeration of all his symptoms at the commencement of treatment. Improvement is not observed until one or two

months later. Consequently, conclusions regarding the effect of treatment should only be drawn after an observation of several months. Likewise the visual disturbances do not occur before 3 to 5 weeks after the beginning of treatment. The author has noticed that if 5 injections have been well-borne, then no untoward result is to be anticipated from further treatment. The body in time becomes capable of converting tryparsamide into a harmless compound. Thus the possibility presents itself that, just as we avoid an anaphylactic shock, so we can avoid hypersensitiveness to tryparsamide by beginning with small doses.

The author's observations on tryparsamide therapy with small doses are limited to eight months. The time is short, but nevertheless long enough to form an opinion of the effect on vision since disturbances of sight, when they do occur, set in during the first month or two.

Of 16 patients treated with weekly doses of 0·5 gm. of tryparsamide for at least 8 weeks none has developed the slightest disturbance of sight. On the other hand, recovery is but slightly slower than after the usual doses. From the beginning of treatment parasites are no longer to be seen in the blood, gland juice, or spinal fluid. The occurrence of arsenic resistance is thus not probable if it cannot be altogether excluded, because in the interior of the body some trypanosomes may remain which eventually become arsenic-fast. Only year-long observations will enable a decision to be reached. The enlarged glands quickly subside, as likewise does Kérandel's sign. The cell count of the spinal fluid sinks almost as quickly as after large doses of the drug.

The administration of small weekly doses has the disadvantage that the course of treatment is of longer duration. The average length of the course, which with weekly doses of 3·0 gm. is 2½ months, rises with the small dose to over a year. Possibly future experience will show that a dose of 0·5 gm. can be given twice weekly and thus shorten the course materially without risk of eye trouble.

[This paper raises, of course, a very important subject. The author's percentage of cases showing visual disturbance with the ordinary weekly dose of 2 to 3 gm. is unusually high. Possibly his cases were very advanced. Assuming the immediate effect of the small dose is, as the author claims, practically equal to that of the usual dose of 2 gm. or 3 gm., the real question to decide is whether or not a tryparsamide-fast race of trypanosomes is produced. It seems to be commonly agreed that a course of 30 gm. to 40 gm. of tryparsamide is necessary to produce a cure. If this be so—the reviewer must confess that he is not absolutely satisfied with the evidence—does it imply that after, say, 20 gm. trypanosomes are still living in the body? If they are it is indeed surprising that they have not become tryparsamide-resistant. The question seems to the reviewer to be one of the greatest importance in chemotherapy.]

W. Y.

CORSON (J. F.). **A Note on the Cerebrospinal Fluid in Two Relapsed Cases of Rhodesian Sleeping Sickness during Treatment with Tryparsamide.**—*Jl. Trop. Med. & Hyg.* 1930. Aug. 15. Vol. 33. No. 16. p. 233.

After giving the clinical history of two cases of *rhodesiense* infection in natives of the Maswa district of Mwanza, Tanganyika Territory, the author writes:—

"So far as can be judged by these observations which extend only over a short period, tryparsamide has no more effect on the trypanosomes in the central nervous system in late cases of Rhodesian sleeping sickness than on those in the blood either in early or relapsed cases. This contrasts with its reported great curative action in late cases of sleeping sickness caused by *Trypanosoma gambiense*. Further observation of these cases may give some indication of what prognostic value, if any, should be placed upon a diminished cell-count in the cerebrospinal fluid."

W. Y.

NÁJERA (Luis). Valoración relativa de la triparsamida y del Bayer 205, como agentes terapéuticos en la tripanosomiasis humana. [**Relative Value of Tryparsamide and Bayer 205 in the Treatment of Human Trypanosomiasis.**]—*Medicina Países Cálidos.* Madrid. 1930. Sept. Vol. 3. No. 5. pp. 394–406. With 1 chart in text. French summary.

In order to test the relative value of Bayer 205 and tryparsamide, the author in Fernando Po placed 324 consecutive patients admitted for treatment in two groups, by relegating alternate tens to each. The total dose of each drug was 10 gm. in the course of 20 days, thus: 1st day, 0·5 gm.; 3rd, 6th and 9th days, 1·0 gm.; 12th, 15th and 18th days, 1·5 gm.; 20th day, 2·0 gm.; given intravenously in 10 per cent. dilution in distilled water.

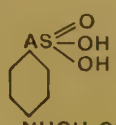
He concludes that the symptoms yield more readily to tryparsamide, but in the later stages of the disease Bayer 205 is clinically more effective; the general condition also improves more quickly with tryparsamide, and the fatality (from trypanosomiasis and intercurrent infections) [presumably during the course, for no mention is made of following up cases afterwards] is only about half when tryparsamide is given. The weight is more favourably influenced by tryparsamide; the blood changes are too slight to give any indication of preference; the effect on the c.s.f. is better with tryparsamide, but when the dosage is the same Bayer 205 is the more powerful trypanocide.

[No mention is made regarding the nature of the infection nor of the method of diagnosis.]

H. H. S.

VAN DEN BRANDEN (F.). Le produit 115 dans le traitement de la trypanosomiase humaine. [**"115" in the Treatment of Human Trypanosomiasis.**]—*Ann. Soc. Belge de Méd. Trop.* 1930. Sept. 30. Vol. 10. No. 3. pp. 275–280. [1 ref.] [Leopoldville Lab., Leopoldville, & School of Trop. Med., Brussels.]

This article deals with clinical trials of an organic arsenical supplied to the author by STRATMAN-THOMAS of Wisconsin and designated "115." It is *n* phenylglycinemethyl-amido-*p*-arsinic acid.



The drug is readily soluble in water and is given intravenously in 20 per cent. solution; the dose for an adult is 2 to 3 gm. Peripheral sterilization follows such a dose in from 5½ to 23 hours. An attempt to determine the duration of peripheral sterilization produced by a single massive dose of 4 gm. was unsuccessful as the patient disappeared after 23 days. During this period, however, weekly examination of the blood by the triple centrifugation method was always negative.

The therapeutic value of the compound was tested both on patients in the first stage and on those in the second stage.

First stage.—Two patients were given respectively 20 gm. and 45 gm. in weekly injections of 2 gm. Details are given from which it appears that both cases did excellently. The author concludes that the action of the drug in such cases is comparable to that of tryparsamide.

Second stage.—Six patients belonging to this category were treated; the spinal fluid contained from 9 to 830 lymphocytes per cmm. Details of each case are given. One patient had a blood relapse after receiving 38 gm. of the drug. In a second patient the lymphocytosis and excess of albumin in the spinal fluid disappeared after 49 gm. In a third patient visual disturbance caused treatment to be interrupted after the administration of 16 gm.; the sight subsequently became normal. In the last three patients the lymphocytosis diminished without, however, becoming normal, after the administration of respectively 20 gm., 80 gm. and 102 gm. of the drug.

The general conclusion reached by van den Branden is that this new drug has a therapeutic value approximately equal to that of tryparsamide; he adds, however [not without reason], that trial should be extended to more numerous cases.

W. Y.

SICÉ (A.). Contribution à l'étude du 270 Fourneau appliqué au traitement de la trypanosomiase humaine. [**Treatment of Human Trypanosomiasis by Fourneau 270.**]—*Ann. Inst. Pasteur.* 1930. Aug. Vol. 45. No. 2. pp. 221–242. [3 refs.] [Pasteur Inst., Brazzaville.]

The preparation "270 Fourneau" is the sodium salt of acetyl *p*. amino-o-oxyphenyl arsinic acid. It is employed in 20 per cent. solution in distilled water and is given subcutaneously or intravenously in weekly doses varying from 15 to 30 or 35 mgm. per kilo. of body weight. Between 1925 and 1929 a total of 357 patients have been treated with the drug; 106 were in the first stage of the disease and 251 in the second stage with altered cerebrospinal fluid. As these two groups reacted differently to the drug they are dealt with separately.

Patients in the first stage. The drug is a powerful trypanocide causing rapid disappearance of the trypanosomes from the blood and glands. Of the 106 patients belonging to this category 97 had received no previous treatment. Four (3·7 per cent.) relapsed, in 3 (2·8 per cent.) the disease progressed and involved the cerebrospinal system, 35 (33 per cent.) disappeared, 3 (2·8 per cent.) died, and 61 (57·7 per cent.) were apparently cured. Details are given in tables.

Patients in the second stage. In this category are grouped all cases in which the spinal fluid contained more than 5 cells and 15 to 22 mgm. of albumin. Of the 251 patients 213 had not previously received

treatment. In 3·5 per cent. there were blood relapses, in 13·1 per cent. the disease progressed, in 51·3 per cent. there was prolonged improvement (possibly cures) and 14·3 per cent. died. Details are given in very instructive tables.

The author observed two complications from use of the drug. The first, which consisted of vomiting many hours after its administration, was not accompanied by any constitutional disturbance and was of no importance. The second consisted of visual troubles of the kind met with in the use of tryparsamide but, unfortunately, they occur earlier and are more frequent; these visual disturbances were never seen in patients in the first stage of the disease, but were met with in 1·9 per cent. of the nervous cases.

The author states that the drug can be given with equal result either subcutaneously or intravenously. He recommends an initial dose of 15 mgm. per kilo. of body weight increasing by 5 mgm. each weekly dose until the maximum of 30 to 35 mgm. is reached; at this level the treatment should be continued until a total quantity of 300 to 350 mgm. per kilo. of body weight has been given in patients of the first stage. The average course of the treatment is thus ten to twelve weeks. In the nervous type the drug must be given with great caution, and the treatment continued until the spinal fluid has become normal.

W. Y.

GIEMSA. Ueber weitere chemotherapeutische Studien mit einer neuen Benzolarsinsäure (Arsenpräparat 4002). [**Further Chemotherapeutic Studies with a New Benzol Arsinic Acid (Prep. 4002).**] —*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1930. Vol. 69. No. 1/2. pp. 86–99. [18 refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]

This paper is a continuation of the author's preliminary report on the therapeutic activity of a new organic arsenical known as "Prep. 4002" prepared by the I.G. [this *Bulletin*, Vol. 27, p. 832]. The toxicity of the compound for laboratory animals is given in the following table:—

Animal.	Method of administration.	Dose tolerated per 20 gm. of animal in mgm.	Dose tolerated per kilo. of animal in mgm.	Lethal dose per kilo. of animal in mgm.
Mice ...	Subcutaneous	75	3,750	7,000
Rats ...	,,		500–600	1,500
Rabbits ...	,,		500–600	800–1,000
Guineapigs	,,		200	300
Mice ...	Intravenous	45	2,250	4,000
Rabbits ...	,,		400	600
Cats ...	,,		200	400
Mice ...	Oral	200	10,000	15,000
Rabbits ...	,,		400–500	700–800
Cats ...	,,		400	

The therapeutic action of the drug was tested for various strains of trypanosomes in mice and rats, and the results are summarized in a table which is here reproduced.

THERAPEUTIC EXPERIMENTS WITH INFECTED MICE AND RATS. A SINGLE SUBCUTANEOUS INJECTION GIVEN.

No.	Drug.	Animal employed.	Trypanosome strain.	Animal in which strain was maintained.	Day of treatment after infection.	Curative dose in mgm. per 20 gm. mouse and 1 kilo. rat.		Maximum well tolerated dose per 20 gm. mouse and 1 kilo. rat.	Index.
						Occasional cure.	Radical cure.		
1	Atoxyl ...	Mouse ...	Nagana 30	Mouse ...	5–6	4	—	4	Worse than 1 : 1
2	Tryparsamide	,, ...	,, ,, ...	,, ...	5–6	30	36	45	1 : 1·25 to 1 : 1·5
3	4002 ...	,, ...	,, ,, ...	,, ...	5–6	6	10	75	1 : 7·5 to 1 : 12·5
4	,, ...	,, ...	Nagana Prowazek ...	,, ...	5–6	3	5	75	1 : 15 to 1 : 25
5	,, ...	,, ...	*T. rhodesiense*... ...	,, ...	6–7	4	5	75	1 : 15 to 1 : 18·7
6	,, ...	,, ...	*T. gambiense*	Rat ...	Chronic infection	8	10	75	1 : 7·5 to 1 : 9·3
7	,, ...	,, ...	*T. equiperdum* ...	Mouse ...	5–6	8	10	75	1 : 7·5 to 1 : 9·3
8	,, ...	,, ...	*T. equinum*	,, ...	5–6	20	50	75	1 : 1·5 to 1 : 3·7
9	,, ...	,, ...	*T. evansi*	Guineapig	Chronic infection	7	10	75	1 : 7·5 to 1 : 10·5
10	,, ...	Rat ...	*T. evansi*	,,	,,	600	—	500–600	Worse than 1 : 1
11	,, ...	Mouse ...	*T. congolense*	Rat ...	10–20	75 Never curative	—	75	—
12	,, ...	,, ...	*Schizotryp. C.*... ...	,, ...	15–18	75 Without any action	—	75	—
13	,, ...	Rat ...	*T. lewisi*	,, ...	Not pathogenic	500 Without any action	—	500–600	—

These results are considered in detail and the following summary of the conclusions is given :—

The grounds are discussed for searching among the aromatic arsinic acids for new trypanocidal and spirochaeticidal compounds of greatest therapeutic action. Such grounds lay chiefly in the greater diffusion capacity of the arsinic acids as compared with the arsenobenzols and other chemotherapeutic compounds, e.g., Bayer 205.

From new compounds of this sort good results were to be expected in the treatment of the late stages of sleeping sickness and syphilis since the parasites living in the spinal canal are readily accessible to molecularly dissolved compounds. With the increasing field of action of such compounds the chances grow that the portion penetrating the spinal fluid after a moderate dose will reach sterilizing concentration.

A new benzol arsinic acid " Prep. 4002 " offers good prospects for the therapy of sleeping sickness, because in experiments in laboratory animals it shows a far greater trypanocidal power than other hitherto employed pentavalent arsenical compounds (atoxyl, tryparsamide), and because it has a pronounced action on *T. rhodesiense* which is strongly resistant to other arsenicals.

It can be shown that $\frac{1}{4}$ to $\frac{1}{3}$ of the amount of the drug injected remains in molecular solution in the blood and can be separated by ultrafiltration of the blood serum.

For combined treatment " Bayer 205 " ranks in the first class.

The preparation also acts on spirochaetes. Rabbits infected with syphilis can be cured by parenteral or oral administration of the drug.

W. Y.

i. Reiner (K.) & Leonard (Clifford S.). **On the Mechanism of Chemotherapeutic Action. I. Formation of the Parasitotropic Agent from Arsenicals.**—*Proc. Soc. Experim. Biol. & Med.* 1930. May. Vol. 27. No. 8. pp. 788–791. [7 refs.]

ii. ——, —— & Chao (S. S.). **Mechanism of Chemotherapeutic Action. II. Rôle of Reticulo-Endothelial System in Formation of a Parasitotropic Agent from Arsenicals.**—*Ibid.* pp. 791–793. [16 refs.] [Experim. Research Labs., Burroughs Wellcome & Co., Tuckahoe, N.Y.]

i. Reference is made to a previous paper in which it was shown that Bayer 205 once bound to trypanosomes could not act upon other trypanosomes. It was expected that arsenicals would behave similarly to Bayer 205, but this was found not to be the case. If an emulsion of trypanosomes was brought in contact with neoarsphenamine dissolved in nutrient broth in a dilution of 1/5,000, or with sodium atoxylate, and allowed to stand for 20 minutes, then centrifuged and washed, the trypanosomes remained almost as virulent as the controls. It is remarked that the time of action and dilution of the chemotherapeutic agent were far below the limits which produce a damaging effect as shown by the change in motility.

These experiments show that the arsenicals investigated either were not bound to the parasite, or, if bound, were not active as chemotherapeutic agents. Since these compounds are active when injected into infected animals, it seemed probable that an interaction occurs between the chemotherapeutic agent and the host, resulting in a production of a new active compound. The findings of Swift and Ellis,

and of STÜHMER, indicated that such compounds might be present in the blood of a non-infected healthy animal treated with neoarsphenamine. Corresponding experiments were conducted in three stages: (1) treatment of a normal animal with the arsenic compound; (2) treatment of the trypanosomes with the serum of an animal treated with the chemotherapeutic agent; (3) infection experiments, in the manner described above, with trypanosomes treated with the plasma or serum from rats and rabbits, both arsenic treated and untreated.

In Stage 2 no *in vitro* parasiticidal action could be detected, but in Stage 3 trypanosomes treated with neoarsphenamine-plasma or serum showed, in accordance with the experiments of SWIFT and ELLIS, a distinct protection as compared to infections with the same number of trypanosomes treated similarly with normal plasma or serum.

The author concludes as follows:—

"Whereas, in the case of Bayer 205 the chemotherapeutic action is due to two factors, namely direct action of the chemotherapeutic agent on the parasite and protective action of the host (reticulo-endothelial system), in the case of arsenic compounds an interaction between the host and the chemotherapeutic agent must also be assumed, since, *compared with the arsenic content, a very active parasitotropic agent is present in the serum or plasma of animals treated with neoarsphenamine. This agent acts by the same mechanism as Bayer 205.* The active compound is probably a loose combination of serum protein (globulin) and neoarsphenamine, for it is also formed *in vitro* by mixing neoarsphenamine with serum or plasma.* Atoxyl and tryparsamide are, however, as little active with serum as either substance in broth. Results, analogous in principle to those obtained with neoarsphenamine, were also found with bismuth thiosulphate."

ii. As the authors succeeded in demonstrating that arsenicals are transformed in the host into a more active parasitotropic agent, they endeavoured to obtain some idea of the importance of the reticulo-endothelium in chemotherapeutic action by investigating its influence on the formation of this active agent in non-infected arsenical-treated animals, thereby eliminating the influence of the blockade on the infection itself. Their procedure was as follows:—

"Animals (rats and rabbits) were injected intravenously with 5 cc. per kilogram of india ink, diluted 1 : 5 with physiological salt solution. Twenty hours later these animals and controls received equal amounts of arsenicals intravenously (sodium atoxylate was given intraperitoneally). Doses: 100 and 250 mg. per kilogram. One day later (in one experiment, 3 hours later) the animals were bled. The plasma of blocked and non-blocked animals was diluted with 3·5 per cent. sodium citrate in the same proportion (1 : 2 or 1 : 3). These plasma were tested for their activity by the combined *in vitro* and *in vivo* method, described previously,† using for each blood sample 2–3 rats. Virulence controls of the trypanosomes were treated similarly with normal plasma, likewise diluted in the same proportion with citrate. In cases where the effect was slight the test was later repeated with the same blood sample and always with exactly the same result, indicating a high accuracy and sensitivity of the method and that the virulence of the control trypanosomes was kept unchanged. The arsenic content of the blood-plasma, spleen and liver was estimated by the Gutzeit method. For relative estimation of neoarsphenamine, we also used the method suggested by Hiramatsu."‡

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* It is obvious that CASTELLI and GONDER were investigating this combination.

† Reiner, L., and Leonard, C. S., *Proc. Soc. Exp. Biol. and Med.*, 1930, xxvii, 788.

‡ Hiramatsu, *Sei-i-Kwai Med. J.*, xlviii, 133; *Eng. Abst.*, 1929, Sect. 5.

It was never found that the blocked animal's blood was less active than that of the unblocked, which would follow if the reticulo-endothelium tended to enhance chemotherapeutic activity. As a rule, the blood of the blocked animals was more active than that of the unblocked and the arsenic content of the plasma was higher in the blocked animals than in the unblocked. The non-blocked spleen usually contained more arsenic than the blocked, but the arsenic content of the liver did not differ in blocked and non-blocked animals.

The authors conclude that " blockade " does not inhibit the formation of the parasitotropic agent in the host, but rather may enhance it. Since the blockade agent tends to increase the arsenic content of the blood of animals treated with arsenicals, it is probable that the increased activity is due to an increased concentration of the active principle.

W. Y.

ADANT (M.). Au sujet de l'arsénorésistance des trypanosomes. [**Arsenic Resistance of Trypanosomes.**]—*C.R. Soc. Biol.* 1931. Jan. 16. Vol. 106. No. 1. pp. 57–58. [4 refs.] [School of Trop. Med., Brussels.]

After discussing the work of LEVADITI and YAMANOUCHI on the production of trypanotoxyl by the action *in vitro* of liver extract on atoxyl and of its recent confirmation by DUBOIS who used tryparsamide instead of atoxyl [this *Bulletin*, Vol. 27, p. 829], the author considered that it would be of interest to attempt to verify in another way whether the trypanotoxyl of LEVADITI is in reality the trypanocidal substance elaborated in the organism after the injection of such medicaments as atoxyl or tryparsamide. He prepared trypanotoxyl from tryparsamide and left a dilute solution of it in contact with *T. pecaudi in vitro* for 2 to 3 hours ; he then washed the trypanosomes and injected them into mice. When the mice showed parasites in the blood he treated them with 2 to 2·5 cgm. of tryparsamide and compared the result with that obtained with mice infected with the normal strain. No difference was observed, the treated trypanosomes being just as susceptible as the normal strain.

W. Y.

KOLMER (John A.) **A Note on the Trypanocidal and Spirocheticidal Activity of " Bayer 205 " (Germanin).**—*Amer. Jl. Syph.* 1930. July. Vol. 14. No. 3. pp. 320–325. [4 refs.] [Research Inst. of Cutaneous Med., Philadelphia.]

The following summary is given :—

" 1. The maximum tolerated dose of a lot of Bayer 205 was found to be approximately 0·380 gm. per kilo of rat by intravenous injection.

" 2. The trypanocidal activity of Bayer 205 for rats infected with *Tr. equiperdum* was found to be from 2 to 3 times higher than arsphenamine, about 5 times higher than neoarsphenamine and about 140 times higher than tryparsamide.

" 3. The chemotherapeutic index of Bayer 205 in experimental trypanosomiasis (*Tr. equiperdum*) was found to be about 190 while the index for arsphenamine was about 21·6, neoarsphenamine 34, and tryparsamide 3·6."

W. Y.

i. LAUNOY (L.) & PRIEUR (M.). Nouveaux documents relatifs à l'étude du mécanisme de l'action trypanocide du 205 Bayer–309 Fourneau. [**Mechanisms of Trypanocidal Action of Bayer 205.**]—*C.R. Soc. Biol.* 1930. Dec. 12. Vol. 105. No. 34. pp. 690–692. [2 refs.]

ii. —— & ——. Action synergique d'un sérum spécifique et du 205 Bayer–309 Fourneau, injecté à dose curative fractionnée, dans le traitement du nagana expérimental de la souris.—[**Synergism of Specific Serum and Small (Non-Curative) Doses of Bayer 205 in Experimental Trypanosomiasis in Mice.**]—*Ibid.* pp. 692–694. [1 ref.]

i. Further experiments are recorded supporting the conclusions previously published [this *Bulletin*, Vol. 27, pp. 833 and 834].

A cat was injected subcutaneously with a dose of 0·04 gm. of Bayer 205 per kilo. of body weight on December 11th, 1929. On April 10th (121 days later), on May 16th (157 days later) and on June 20th (192 days later) the animal was injected intraperitoneally with 1 cc. of mouse blood containing numerous *T. brucei*. The third injection infected ; the animal had a series of blood crises and died on November 7th—135 days after infection. On September 23rd, when trypanosomes were present in the blood, Mouse A was subinoculated. The mouse showed trypanosomes in the blood on October 8th and died on October 23rd, thus exhibiting a great prolongation of the usual period of infection, viz., 3 days. Two mice subinoculated from Mouse A died after an infection of 5 days.

Another Mouse B was subinoculated from the cat on October 14th ; this mouse died on November 8th, i.e., after an infection of 25 days ; a mouse subinoculated from it died in 10 days.

Another similar experiment, in which the prophylactic dose of Bayer 205 was 0·015 gm. per kilo., is described, as is also a comparable experiment in a mouse.

As the result of this work, the authors conclude that after a prophylactic dose of Bayer 205, although the animals may have lost their refractory state, one can nevertheless observe in certain cases a condition which is characterized by a diminution of virulence of the trypanosome. This diminution of virulence may be such that a spontaneous cure may result, or, failing this, there may be a remarkable prolongation in the evolution of the disease. As a rule, the normal virulence is regained in the second passage, but sometimes not until the fourth passage.

ii. As shown in previous papers, three things may happen when an animal (cat) which has received a preliminary dose of Bayer 205 is injected with trypanosomes after it has lost its refractory state. The animal may behave as normal and succumb to the infection in the usual time ; the injection may be short and subside spontaneously ; or the infection may assume a relatively chronic form proving fatal only after a prolonged period. In the present paper experiments are recorded which were devised with the object of throwing light on the mechanism of this phenomenon.

The serum of a rabbit, infected with nagana on September 23rd and killed on October 3rd, was heated to 55° C. Thirteen mice, the blood of which contained 4 to 6 parasites per microscope field, were divided into three groups. Group 1 (5 mice) were given intravenously increasing doses of the rabbit serum, viz., 0·3 cc. to 0·7 cc. per 20 gm. body weight ; in each case the volume injected was made up to 1 cc. by the addition of physiological saline. Group 2 (5 mice) were given the same quantities of serum

+0·000015 gm. of Bayer per 20 gm. mouse. Group 3 (3 mice) were given the drug alone. Two mice served as controls.

All the mice of Group 1 were dead in 11 days. One of the mice of Group 2 died negative on the 8th day and the remaining four were alive on the 31st day. One of the mice of Group 3 died on the 9th, 10th and 12th days, respectively. The control animals were dead in 72 hours.

In a second series of experiments the conditions were the same except that the dose of drug used was 0·00001 gm. per 20 gm. mouse; and in a third series the serum of a normal rabbit was used instead of that of an infected animal.

It thus appears that the addition of a fraction of the curative dose of Bayer 205 (about $\frac{1}{4}$) to a quantity of specific serum, insufficient of itself to sterilize the mouse, allows of sterilization of the organism. There is here to be seen a very clear example of synergism.

W. Y.

ZEISS (Heinz) & UTKINA-LJUBOWZEWA (Xenia). Weitere Untersuchungen ueber den Nachweis von Germanin (Bayer 205) im tierischen Organismus. [**Further Investigations on the Distribution of Germanin (Bayer 205) in the Animal Organism.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1930. Vol. 68. No. 1/2. pp. 170–181. [17 refs.]

A summary is given of the previous work of MAYER and Zeiss, and others, showing that the presence of "Bayer 205" could be demonstrated in the serum and in certain organs of animals for considerable periods after they have been injected or fed with the drug.

In the present work the authors have continued their investigations on this subject. Their general plan of investigation was as follows:—

1. The treatment of healthy rabbits with germanin, complete exsanguination, and colorimetric estimation of the drug in the serum and organs. This method was based on the work of STEPPUHN, Zeiss and BRYCHONENKO [this *Bulletin*, Vol. 21, p. 394] and of STEPPUHN and Utkina-Ljubowzewa (1924).*

2. The treatment of trypanosome infected rats with germanin serum from rabbits.

3. Various biological therapeutic experiments with germanin serum from sheep, and germanin-spinal fluid from men and trypanosome infected rats.

In the first experiments three rabbits were injected intravenously and one subcutaneously with doses varying from 0·4 to 0·7 gm. of germanin and the amount present in 1 cc. of serum determined after intervals varying from 2 hours to 43 days.

In the next series of experiments six rabbits were given an intravenous injection of the drug, exsanguinated after various periods, and the amount of drug present in the various organs determined. The result of all this work is summarized in tables from which it is seen that the highest concentration is found in the serum, and that, of the various organs examined, the kidneys, lungs, spleen and liver contain the greatest quantity of the drug.

The authors next pass to an enquiry concerning the therapeutic activity of the serum of normal rabbits injected with "Bayer 205." Two rabbits were injected with 0·7 gm. of the drug and exsanguinated on the eleventh and twenty-first days afterwards respectively. The serum of the first showed by the colorimetric method only a trace of the drug, whereas that of the second showed 0·2 mgm. in 1 cc. In subsequent experiments of this

* An error in this paper is corrected here, viz.:—
n × 3 NaOH instead of n/4 NaOH;
n × 4 CH_3COOH statt n/3 CH_3COOH.

kind a sheep was injected subcutaneously with 0·1 gm. per kilo. of the drug; blood was then withdrawn from the animal after 1 hour and on each of the twelve following days, and the therapeutic action of the serum tested in rats infected with *T. brucei*. The results of all these observations are set forth in a table from which it is seen that in every case the germanin serum had a definite therapeutic activity, but, as a general rule, the longer the period which elapsed before the serum was withdrawn after injection of the drug, the less active it was.

The cerebrospinal fluid of a patient suffering from multiple sclerosis, who had been treated with "Bayer 205," had no therapeutic activity when injected subcutaneously or intraperitoneally into infected mice.

W. Y.

WILSON (Douglas E.). **Mercuric Chloride in the Diagnosis of Human Trypanosomiasis** (*T. rhodesiense*).—*Jl. Trop. Med. & Hyg.* 1930. Aug. 1. Vol. 33. No. 15. pp. 217–221. [1 ref.]

After reading the paper of BENNETT and KENNY (1928)* entitled "Mercuric chloride as a diagnostic agent for trypanosomiasis in camels," the author decided to apply the test in the case of African natives suffering from sleeping sickness in Tanganyika Territory.

In its simplest form the test consists in adding to 1 cc. of various dilutions of $HgCl_2$ in distilled water one drop of a patient's serum and observing whether a precipitate forms within a certain time. The following dilutions of $HgCl_2$ were prepared:—1 : 15,000, 1 : 16,000, 1 : 17,000, 1 : 18,000, 1 : 20,000, 1 : 25,000, 1 : 30,000, 1 : 35,000, and in one or two cases a titre of 1 : 50,000 or 1 : 100,000 was used. The severity and especially the age of infection seemed to play an important part in the reaction. A heavy blood infection did not necessarily signify a well-marked reaction, but this was always observed in debilitated and old patients.

The time of the reaction was 15 to 20 minutes; if no precipitate appeared in 20 minutes the serum was considered to be negative. The serum of most healthy natives gives a slight milky colour to the reagent, but seldom, if ever, did a precipitate develop after 20 minutes. This milky appearance the author attributes to latent malaria or other protozoal disease; such infections do give a certain amount of reaction, but never comparable with the very marked reaction obtained in sleeping sickness. The serum of Europeans and of most normal controls gave absolutely no reaction.

The results of the observations are summarized in tables from which it is seen that the serum of patients who had received no previous treatment always gave a precipitate with high dilutions of mercuric chloride. Three cases in which 1 gm. of "Bayer 205" had been given before the test gave faintly positive results, as did also the serum of strongly positive cases to which a little "Bayer 205" had been added just before the test. The serum of relapsed or re-infected cases gave strongly positive reactions. Tests done with the serum of treated cases in which the blood had become free from trypanosomes were practically all negative.

The following are the conclusions:—

"1. Although the test is not specific, the precipitate is so very marked in cases of sleeping sickness that I should have no hesitation in treating a case

* *Jl. Comp. Path. & Therap.* Vol. 41, pp. 341–353.

as one of sleeping sickness (no microscope being available), provided I obtained in a patient the following facts :—

"(*a*) Some clinical signs and symptoms of sleeping sickness.

"(*b*) The patient came from a sleeping sickness area, or gave a history of having recently visited one.

"(*c*) A 5+ precipitate was obtained with the mercuric chloride test in high dilutions, say 1/20,000.

"2. Cases 16, 17, 18, 19, and 22 help to prove that tryparsamide is useless in the initial treatment of trypanosomiasis (*T. rhodesiense*).

"3. Cases 51 and 52 appear to prove that it is possible to have at intervals the peripheral blood microscopically negative and yet have an infected central nervous system.

"4. The results closely resemble those obtained with the serum formalin reaction in cases of sleeping sickness.

"5. That unfortunately the results are not specific for trypanosomiasis.

"6. That a negative result in a European case would be a valuable aid in estimating the progress and prognosis of the disease, provided that one had a low cell-count in the cerebrospinal fluid."

W. Y.

DUKE (H. Lyndhurst) & WALLACE (J. M.). **"Red-Cell Adhesion" in Trypanosomiasis of Man and Animals.**—*Parasitology.* 1930. Oct. Vol. 22. No. 4. pp. 414–456. [9 refs.] [Human Trypanosomiasis Inst., Entebbe, Uganda.]

The authors state that in this paper they have not attempted to make a complete study of the mechanism of the adhesion phenomenon, but merely to define its limitations as a clinical test and to compare their results, in so far as they are comparable, with those of previous workers. They point out that the bulk of the experimental work on the Rieckenberg phenomenon in trypanosomiasis has so far been done with highly virulent laboratory strains. Definite serological differences have been noted between "passage" and "relapse" strains, and also between different "relapse" variants from a single "passage" strain. This delicacy of discrimination seemed to augur badly for the success of the adhesion test in the diagnosis of the chronic trypanosomiases with which the authors were concerned in Uganda. Early attempts to demonstrate the phenomenon of adhesion tended to confirm these doubts. Using concentrated citrated "immune" and "trypanosome" plasmas under high power magnification and dark ground illumination, the results obtained with both *T. gambiense* and *T. rhodesiense* were entirely inconclusive. Hardly any adhesion was observed either of blood dust or of platelets, and that little was equalled in the control preparations. The technique of JOHNSON and LESTER gave similar unconvincing results. This gave rise to the inevitable conclusion that the serological homology between the reagents used by the authors, viz., the "immune" and "trypanosome" plasmas, was not sufficiently close to give a positive test.

The method recognized by LEUPOLD [this *Bulletin*, Vol. 26, p. 208] was then tried and the authors obtained their first success. On adding to a drop of citrate one drop of blood from a monkey infected with *T. rhodesiense*, which had a few days before received a curative dose of Bayer 205, and one drop from another monkey heavily infected with the same strain, every trypanosome was seen to have red blood corpuscles sticking to it ; no other adherent body was seen, although

in all the preparations manifesting exclusively red cell adhesion, there were plenty of platelets to be seen among the red cells, but they remained apparently untouched.

There follows a lengthy and detailed description of the experiments performed by the authors. The results are summarized in tables which, probably owing to their necessary condensation, are rather difficult to follow. The first portion deals with experiments with *T. gambiense*, *T. rhodesiense*, the Damba trypanosome, and *T. congolense* in laboratory animals ; the second portion with human cases of trypanosomiasis, and the third with an analysis of the mechanism of the adhesion test.

In the general discussion which follows the record of experimental work, the authors point out that, although previous investigators have been unanimous in claiming that the adhesion phenomenon is strictly specific, their own experiments have shown that strong reactions may take place between reagents from sources differing widely in many important respects. They consider several possible explanations of this contradiction. They are unable to accept the view that the red blood cell adhesion is of a different nature from platelet adhesion, the latter being strictly specific, and the former fortuitous in its reaction. They are inclined to believe that the explanation lies in the fact that the acutely pathogenic parasites of the well-known polymorphic trypanosomes found in many European laboratories react differently to the tissues of their hosts from the very much milder strains obtained from wild tsetse. This hypothesis is discussed at some length.

The following summary is given :—

" (1) An adhesion phenomenon has been described in which, in certain circumstances, red blood corpuscles adhere to trypanosomes.

" (2) We believe this red-cell adhesion to be a manifestation of the adhesion phenomenon already described by other workers both with trypanosomes and spirochaetes.

" (3) The substance responsible for this phenomenon of adhesion is designated in this paper *adhesin*.

" (4) The red-cell adhesion test has been studied in relation to several strains of polymorphic trypanosomes, all of which were either recently isolated from naturally infected man or animals, or had been recently passed cyclically through tsetse.

" (5) It is shown that the adhesion phenomenon is irregular and uncertain in its appearance. A single or even a number of negative observations do not exclude trypanosomiasis. A positive reaction, on the other hand, indicates recent or actual infection with a trypanosome of the same group, but not necessarily specifically identical with that employed as antigen in the test. Thus *T. gambiense* adhesin bloods not uncommonly react with *T. rhodesiense* trypanosomes and also on occasion with the Damba strain : the converse is apparently of less common occurrence.

" (6) Adhesins appear in an animal's blood in the course of its infection with trypanosomes, whether the animal be treated with trypanocidal drugs or not. When sterilising doses of such drugs are employed the adhesins gradually disappear in the course of a few months ; but in untreated infections of *T. gambiense* they have been shown to persist in an active form for more than two years.

" (7) With our material it was found impossible to distinguish between " passage " and " relapse " strains by means of the adhesion test. On the contrary it was found, at all events with *T. gambiense*, that the best way to call forth the reaction in the blood of animals long infected is to employ trypanosomes from a very early infection.

" (8) Guinea-pigs have been found to be unsatisfactory animals in which to demonstrate adhesins ; they are, however, useful as a source of sensitive trypanosomes. When only guinea-pig elements are present in a test a positive reaction is indicated by platelet not by red-cell adhesion.

" (9) The presence of adhesins in the blood has no apparent relation to immunity against the homologous trypanosome.

" (10) The test has been applied to over 200 human cases of trypanosomiasis in the Uganda Protectorate, and with six of these repeated observations were made. Some of these human cases reacted both to *T. gambiense* and *T. rhodesiense*, but none to *T. rhodesiense* alone.

" (11) A partial analysis has been made of the mechanism of red-cell adhesion, which has been shown to be in some way associated with the presence of the red corpuscles of primates. This fact probably explains why other workers appear not to have noticed red-cell adhesion in the extreme form we have described in this paper."

[It is difficult to do justice to this long and rather complicated paper in a summary of reasonable length, and those interested should consult the paper in the original.]

W. Y.

TAYLOR (A. W.). **Experiments on the Mechanical Transmission of West African Strains of *Trypanosoma brucei* and *T. gambiense* by *Glossina* and Other Biting Flies.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. Nov. 25. Vol. 24. No. 3. pp. 289–303. [9 refs.]

The author has re-examined the question of the mechanical transmission of trypanosomes by various biting insects. His conclusions are as follows :—

" 1. Four strains of *T. brucei* have been successfully transmitted by the direct method, using *G. tachinoides* as mechanical vector.

" 2. Direct transmissions of *T. brucei* by *G. tachinoides* have only been carried out where the interval between the break in the infecting feed and the resumption of the flies' meal on a clean animal does not exceed ten minutes.

" 3. Successful transmission has been effected by as few as four infecting bites.

" 4. Direct transmissions of *T. brucei* by the agency of *G. tachinoides* have only proved successful where the average number of trypanosomes in the peripheral blood of the infected animal exceeds one in five microscopic fields.

" 5. Some difference appears to exist in the direct transmissibility of the three strains of *T. brucei* used.

" 6. Negative results have been obtained in each of fifteen direct transmission experiments in which attempts were made to transmit six strains of *T. gambiense* by the agency of *G. tachinoides*.

" 7. *T. brucei* has been successfully transmitted by *S. calcitrans* by the direct method.

" 8. Experiments in which attempts have been made to employ *A. costalis*, *A. funestus*, *Aëdes vittatus*, and *Lyperosia* (sp. ?) as mechanical vectors of *T. brucei* have failed to effect transmissions.

" 9. Dissection and examination of the proboscis of *G. tachinoides* at intervals after an infecting meal, reveals the fact that motile trypanosomes may survive in the proboscis for as long as three hours ; and that the maximum number of trypanosomes contained in the proboscis immediately after an infecting meal is often very considerably in excess of 600 when trypanosomes are abundant in the peripheral blood of the infected animal.

"10. A brief account is given of the behaviour of trypanosomes taken up during an infected blood meal in the proboscis and gut of *Stomoxys*, *A. costalis*, *A. funestus* and *Lyperosia*. In none of these flies do the trypanosomes survive in the proboscis as long, or in such large number, as in *G. tachinoides*."

W. Y.

TAYLOR (A. W.) & LESTER (H. M. O.). **Note on the Effect on the Infection Rate in the Tsetse of mixing Two Strains of Trypanosomes in its Infecting Feeds.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. Nov. 25. Vol. 24. No. 3. pp. 305–307. [1 ref.]

Reference is made to a recent paper by LLOYD [this *Bulletin*, Vol. 27, p. 846] in which by mixing two strains of *T. brucei* in the infecting feeds of a series of bred *G. tachinoides* he obtained a considerably higher infection rate than that which resulted from feeding flies on either of the single strains. Attention is recalled to the possible errors arising from the fact that LLOYD used relatively small numbers of flies. The subject is of obvious importance and consequently the authors determined to re-examine it, repeating the technique employed by LLOYD, but using considerably greater numbers of tsetse.

The conclusions are :—

"The above figures indicate that the mixing in the tsetse of two strains of a trypanosome does not tend to produce a higher infection rate in the fly than that which results when the single strains are employed.

"It is thought possible that the large variations in infection rates in the individual groups of flies used by Lloyd were caused by some other factor or factors."

W. Y.

VAUCEL (M.). Identification du trypanosome d'une infection humaine de laboratoire. [**Identification of the Trypanosome of a Laboratory Infection in Man.**]—*Bull. Soc. Path. Exot.* 1930. July 9. Vol. 23. No. 7. pp. 715–719. [1 ref.]

A detailed account is here given of the work referred to briefly by MESNIL in his recent paper on the adaptation to man of the trypanosomes pathogenic to mammals [this *Bulletin*, Vol. 27, p. 807]. In July 1929 a laboratory assistant at the Pasteur Institute developed violent attacks of fever, and examination of the blood revealed numerous trypanosomes. The patient stated that in the course of his work he had only been concerned with a strain of nagana which was considered as merely pathogenic to animals.

The blood of the patient was inoculated on July 30th, 1929, into two guineapigs which became infected. The strain, which is designated after the patient virus *Emile*, was then maintained by passage through mice. The virulence is of the same order as that of the nagana strain. Serological tests allied the virus *Emile* with *T. brucei*. The serum of a guineapig infected with virus *Emile* taken at the crisis lysed virus *Emile* and *T. brucei* equally, but had no action on *T. gambiense*; the serum of a guineapig infected with *T. brucei* behaved similarly, but that of a guineapig infected with *T. gambiense* lysed this parasite, but not virus *Emile*. Furthermore, the serum of guineapigs infected with *T. brucei* exhibited a protective action against virus *Emile* and that of guineapigs infected with virus *Emile* against *T. brucei*, but neither had any protective action against *T. gambiense*.

The author then examined the protective and curative power of human serum against each of the above three strains and *T. evansi* in mice. It was found that human serum exercised a protective action against *T. gambiense*, but had no curative action. This sensitiveness to human serum was noticed by MESNIL in 1925; the strain in question was isolated from man in 1920. *T. brucei* was definitely more sensitive than *T. gambiense*, but not so sensitive as formerly; it, like *T. gambiense*, had undergone a change, but in the reverse direction. The *Emile* strain was practically insensitive to human serum, whereas *T. evansi* was very sensitive to it.

In conclusion the author notes that the passage through man of the old laboratory strain of *T. gambiense* has conferred on it a new resistance to human serum.

W. Y.

DI DOMIZIO (Giovanni). A proposito dell'esistenza del *Trypanosoma vivax* nell'uomo. [**On Human Infection by** *Trypanosoma vivax*.]—*Nuova Vet.* 1930. July 15. Vol. 8. No. 7. pp. 7–9. With 2 text figs. [1 ref.]

Arguing from experimental inoculations in a calf the author discusses the case recorded by LAVIER in 1926 of a man infected by *T. gambiense* presenting parasites of the *vivax* form [this *Bulletin*, Vol. 24, p. 953]. A calf was inoculated with *T. brucei* but for 3 months showed no symptoms and was regarded as not having taken the infection. It was then injected with *T. cazalboui* and developed typical acute infection with abundant trypanosomes (*T. cazalboui*) in the blood and gland juice. Inoculations from this animal into dogs and rats caused infection in one of the former and two of the latter, but the trypanosomes were typical *T. brucei* and not *T. cazalboui*, from which the author deduces that the former had remained latent in the calf, especially as dogs. rats, mice, guineapigs, monkeys, etc., are not receptive to the latter (*vivax cazalboui caprae uniforme* group). He interprets LAVIER's case as one of dual infection by *T. vivax* and *T. gambiense*. During the 5-6 days in which the patient was examined *T. vivax* was found, the other remaining latent. His blood being then injected into a monkey and a rat, infection occurred bringing into evidence the latent *T. gambiense*, since these animals are not susceptible to *T. vivax*, and this led LAVIER to the conclusion that *T. gambiense* had presented itself in the form of *T. vivax*.

H. H. S.

CORSON (J. F.). **Observations on** *Trypanosoma rhodesiense* **in Sheep and Goats.**—*Jl. Trop. Med. & Hyg.* 1930. Dec. 15. Vol. 33. No. 24. pp. 385–389.

The author describes observations made with the object of studying the effect of continued direct transmission of *T. rhodesiense* through sheep and goats. The work was done in the Mwanza province of Tanganyika Territory, in a place where the nearest tsetse are four miles away. Three strains of *T. rhodesiense* were used; in one the trypanosomes were injected directly into sheep and goats, while in the other two the first injection was into a white rat, from which sheep and goats were infected. Transmission was carried on in sheep and goats by subcutaneous injection of infected blood. There were no essential differences in the behaviour of the three strains, and consequently the author contents himself with describing in detail the

behaviour of one of them. Details are summarized in two lengthy tables. A third table shows the effect of subinoculation of white rats, and in Table IV details are given of the injection of normal human serum into some of the infected rats, and the results are shown in Table V.

There was no noticeable change in the infectivity and virulence of the strains throughout the period it was maintained in sheep and goats. No difference was observed in the mortality of the parasites in subinoculated rats. Posterior nuclear forms appeared in characteristic numbers at the end of the period as at the beginning.

The duration of life varied somewhat in animals, especially sheep, infected with the same strain at the same time. Sheep appeared to stand the disease better than goats, but all the infected animals died, mostly within two months from the date of inoculation.

Sixteen infected rats were injected with serum from apparently healthy persons, 12 different sera being used; 13 of the rats had been infected from sheep and goats and the other 3 directly from patients. The trypanosomes from sheep and goats showed, on the whole, a somewhat greater susceptibility to the action of normal human serum than did those coming directly from man.

The following summary is given:—

"(1) The characters by which *T. rhodesiense* is distinguished from *T. gambiense*, such as high infectivity and virulence for laboratory animals, rapid multiplication and the occurrence of numerous posterior-nuclear forms in the blood of these animals, were preserved by the trypanosome during maintenance for six months in sheep and goats. The trypanosomes showed also, on the whole, a somewhat greater susceptibility to the action of normal human serum, when tested in subinoculated white rats, than was shown when rats were directly infected from man.

"(2) * *So far as can be judged from these direct passage experiments,* a herd of sheep and goats can remain infected with *T. rhodesiense* for at least several months and possibly throughout its existence as a herd, where opportunities occur for the transmission of the infection.

"(3) The animals are infective throughout the course of the disease, which is short and acute."

W. Y.

VASSILIADIS (P.) & JADIN (J.). Influence de l'hibernation sur le *Trypanosoma rhodesiense*. [**Influence of Hibernation on** *T. rhodesiense*.] —*Ann. Soc. Belge de Méd. Trop.* 1930. June 30. Vol. 10. No. 2. pp. 129–131. [5 refs.] [Bact. Lab., Univ., Louvain.]

A summary is given of the previous work of BLANCHARD and BLATIN (1907), of BRUMPT (1908), and of others on this subject. The authors themselves have worked with the dormouse (*Myoxus nitela*) and with *T. rhodesiense*. Two animals were inoculated with similar numbers of trypanosomes and the one was placed in the ice-chest and the other kept in the laboratory. The latter animal showed parasites in the blood in 2 days and died on the 10th day, whereas the blood of the former remained negative up to the 10th day, when it was transferred from the ice-chest to the laboratory; five days later parasites were found in the blood. Two days later—when the blood showed a couple of trypanosomes per microscope field—the animal was returned to the ice-box and after a further six days the parasites had completely disappeared from the blood. When, after a month of hibernation, the dormouse was again transferred to the laboratory, it was found to be cured. Sixteen days later it was re-

* Italics not in original.

inoculated with *T. rhodesiense* and was found to possess a certain degree of immunity in that the infection resulting ran a much more chronic course than that in control animals.

W. Y.

VASSILIADIS (P.). L'action du sérum humain sur les trypanosomes. [**The Action of Human Serum on Trypanosomes.**]—*Ann. Soc. Belge de Méd. Trop.* 1930. June 30. Vol. 10. No. 2. pp. 117–122. [11 refs.] [Bact. Lab., Univ., Louvain.]

The author has studied the action of human serum in wild white rats and in *Mus rattus* and *Mus decumanus* infected with *T. pecaudi* and *T. rhodesiense.* The dose of human serum was 0·5 cc. for mice of 15 gm. and 1·5 cc. for rats of 200 gm. The results obtained confirm those of previous investigators. Human serum similarly cleared the blood of guineapigs infected with *T. rhodesiense* when given in doses of 2·5 cc. per 250 gm. of body weight.

The disappearance of parasites following the injection of human serum is, however, only temporary; further injections are followed by similarly temporary disappearance of parasites up to a point after which injections of human serum are without action. Vassiliadis then refers to the hypothesis of ROSENTHAL and his co-workers [this *Bulletin*, Vol. 19, p. 154 and p. 520; Vol. 20, p. 337 and p. 700; Vol. 22, p. 143 and p. 537; and Vol. 27, p. 238] that human serum is itself inactive, but is activated by the reticulo-endothelial system of the injected animal. After repeated injections of human serum, the reticulo-endothelial system becomes exhausted and consequently no longer able to activate human serum. Vassiliadis performed a number of experiments which he believes afford support to this hypothesis. [In the reviewer's opinion ROSENTHAL's and Vassiliadis' experiments are explicable on quite other grounds and in no way support ROSENTHAL's hypothesis, which, for the reasons stated in a paper by the reviewer and his colleagues, the reviewer believes to be incorrect (this *Bulletin*, Vol. 27, p. 804).]

Vassiliadis obtained a serum-fast strain of *T. rhodesiense* and has studied the action of tryparsamide and of tartar emetic on this strain. He found that the serum-resistant character, which normally is preserved through numerous mouse passages, is quickly lost under the influence of tryparsamide, but is not modified by treatment with tartar emetic.

W. Y.

NATTAN-LARRIER (L.) & NOYER (B.). Ultrafiltration et pouvoir trypanocide du sérum humain. [**Ultrafiltration and Trypanocidal Power of Human Serum.**]—*C.R. Soc. Biol.* 1930. Dec. 5. Vol. 105. No. 33. pp. 630–632. [4 refs.]

In a previous paper the authors have shown that the trypanocidal substance of human serum is arrested by the placenta, as is also alexine and, in a general way, all natural antibodies. LEVADITI and NICOLAU found that alexine cannot traverse colloidal membranes, and the authors determined to ascertain whether this was likewise true of the trypanocidal substance.

For the preparation of the membrane collodion of the Codex types E and F were employed in the following mixtures :—

Collodion	Nitroglycerine	Ether	Alcohol 95 per cent.
E	2·5 gm.	35 gm.	47 gm.
F	2·5 gm.	35 gm.	35 gm.

From these collodion sacs of two layers were prepared according to Malfitano's technique and mounted on glass tubes. The filtrations were made by aspiration at a pressure not exceeding 15 to 20 cm. of mercury.

Two experiments are described in detail, from which it appears that although the alexine is completely held up by the membrane, the trypanocidal substance readily passes through it.

W. Y.

LOCATELLI (Piera). Sur l'action pathogène des trypanosomes tués. [**Pathogenic Action of Dead Trypanosomes.**]—*C.R. Soc. Biol.* 1930. Nov. 21. Vol. 105. No. 31. pp. 452–454.

The mechanism of the pathogenic action of trypanosomes is still little known. The author has enquired whether the injection into animals of the bodies of dead trypanosomes could produce lesions comparable with those seen in experimental trypanosomiasis. He had previously found in infected guineapigs pronounced and constant alterations in the megakaryocyte and leucocyte system in the bone marrow, and grave lesions in the islands of Langerhans ; consequently he chose guineapigs as the experimental animals in the present work.

Five guineapigs were given massive doses of trypanosomes obtained by centrifuging the blood of heavily infected guineapigs or rats. After washing the parasites in physiological saline, a few drops of distilled water were added and the emulsion kept 48 hours at 0° C., so as to avoid the possibility of any parasite being still alive. The emulsion was made isotonic by the addition of the necessary quantity of concentrated salt solution and was then injected.

Notwithstanding the fact that every care had been taken to preserve sterility, two of the guineapigs died within a few days of peritonitis. The remaining three animals died 13, 16, and 25 days respectively after the first injection ; two of them had received the trypanosomes from 30 rats, and one those from 17 guineapigs, in 5 or 6 injections. The injections were followed by shock and the animals steadily lost weight.

A detailed account of the post-mortem findings is given from which the author concludes that the bodies of trypanosomes contain a substance which, when injected in massive doses—comparable to the quantity of trypanosomes which are destroyed in the course of an experimental infection—has the power of causing the death of the animal and of producing the pathological changes which are habitually found in guineapigs which have died of experimental trypanosomiasis. [This paper should be compared with the author's previous article, this *Bulletin*, Vol. 27, p. 243.]

W. Y.

ANDREWS (Justin), JOHNSON (Carl M.) & DORMAL (V. J.). **Lethal Factors in Experimental Infections of *Trypanosoma equiperdum* in Rats.**—*Amer. Jl. Hyg.* 1930. Sept. Vol. 12. No. 2. pp. 381–400. [24 refs.] [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

Investigations were undertaken with the object of discovering the lethal mechanism by which *T. equiperdum* kills its experimental rat host.

"To conclude, it is believed that *T. equiperdum* causes the death of the rat host into which it is experimentally introduced by asphyxiation. This is brought about by pulmonary edema due to partial obstruction of the circulation by the agglutination of the trypanosomes in the heart and lungs. The consequent anoxemia leads to a non-volatile uncompensated acidosis, and to central necrosis of the liver, interfering with both its glycogenic and glycogenolytic functions and ultimately producing a hypoglycemia."

W. Y.

HARTMANN (E.). Die Verweildauer von stammspezifischen Trypanosomenantikörpern im Kaninchen und die Bedeutung des Antikörpergehaltes für den Ausfall homologer Reinfektionen. [**The Persistence of Strain-Specific Trypanosome Antibodies in Rabbits and the Significance of the Antibody Content in the Occurrence of Homologous Reinfection.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1930. Vol. 68. No. 5/6. pp. 518–530. With 3 text figs. [Skin Clinic, Univ., Munster i.W.]

Reference is made to the previous work of the author on the question whether chancre immunity occurs in superinfection with trypanosome strains which are the relapse variants of the original strain. In this work it was shown that the relapse strain and original strain behave as heterologous strains, infection with one preventing chancre formation on superinfection with the same strain, but not with the other [this *Bulletin*, Vol. 27, p. 851].

In the present work Hartmann has enquired what is the duration of the strain-specific antibody in the animal, and whether the possibility of homologous reinfection is dependent on the antibody titre and whether it may manifest itself as a latent infection. The strain Nagana-Prowazek was employed. The rabbits were inoculated subconjunctivally, subcutaneously in the scrotum or prepuce, or at the entrance to the vagina. The number of parasites injected was apparently immaterial. As a rule the primary effect, with well-defined regional enlarged lymphatics, was fully developed by the fifth day. All the animals were cured by an injection of neosalvarsan (33 mgm. per kilo. of body weight) the day after the appearance of the relapse strain in the blood.

The determination of the presence of antibody was made by the method described by STÜHMER. Each time blood was removed from the rabbit for the antibody test, it was reinoculated with the homologous strain. Certain type experiments are described in detail. The paper, which is rather technical, should be consulted in the original by those interested.

The following are the conclusions :—

The period of persistence of the strain-specific trypanosome antibody after active immunization was in 18 rabbits between 17 and 31 weeks; after passive immunization it was only a few days.

The possibility of homologous reinfection of cured animals with chancre formation is dependent on the titre of the antibody. An homologous reinfection is usually possible with a titre between 1·0 and 0·5.

Latent infections are not seen as the result of reinfections.

W. Y.

GEIGER (A.), KLIGLER (I. J.) & COMAROFF (R.). **The Glycolytic Power of Trypanosomes** (*Trypanosoma evansi*) *in Vitro.—Ann. Trop. Med. & Parasit.* 1930. Oct. 22. Vol. 24. No. 3. pp. 319–327. [8 refs.] [Dept. of Hyg. & Bact., Hebrew Univ., Jerusalem.]

The nature of the metabolism of trypanosomes and its effect on the infected host is still a subject of controversy. One view is that the pathological changes are due to a toxin elaborated by the trypanosomes, while the other attributes the results to a depletion of the glucose and glycogen reserves.

In a previous paper the authors have pointed out that the blood of an infected rat contains an abnormal concentration of lactic acid, which increases progressively with the development of the infection; they believe that this progressive production and accumulation of lactic acid leads to a progressive depletion of the alkali reserve, the process ultimately resulting in death from acidosis.

In the present work an attempt was made to test the validity of this hypothesis by ascertaining the rate of glucose utilization and of lactic acid production by trypanosomes, under controlled conditions *in vitro*.

The following are the conclusions :—

" *T. evansi* consumes dextrose *in vitro* with great avidity with the production of lactic acid.

" It is suggested that this metabolic characteristic plays a significant rôle in the pathology of the disease, finding its most striking manifestation in the rat, where trypanosome development progresses almost unhindered during the later stages of the infection."

[The findings regarding the enormous quantity of glucose consumed by trypanosomes agree with those of the reviewer and his colleagues (this *Bulletin*, Vol. 27, p. 237).]

W. Y.

REGENDANZ (P.). Der Zuckerverbrauch der Trypanosomen (nach Versuchen in vitro bei 37° C) und seine Bedeutung für die Pathologie der Trypanosomeninfektionen. [**The Sugar Consumption of Trypanosomes (seen in** *in vitro* **Experiments at 37° C.) and its Significance for the Pathology of Trypanosomal Infections.**]—*Zent. f. Bakt.* I. Abt. Orig. 1930. Sept. 30. Vol. 118. No. 3/4. pp. 175–186. [23 refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]

The author has repeated the work of the reviewer and his colleagues who showed that trypanosomes living in serum diluted with Ringer-glucose solution at 37° C. consumed a relatively enormous quantity of glucose. Using the same technique, he determined the sugar consumption of *T. rhodesiense*, *T. congolense* and *T. lewisi*; his results corresponded closely with those of the reviewer [this *Bulletin*, Vol. 27, p. 237]. After discussing his numerous experiments in detail, the author considers the significance of the phenomenon for the pathology of trypanosomal infections. He points out that in infected man and the larger animals the number of parasites in the peripheral blood is as a rule very small; moreover, in rats infected with *T. lewisi* the

sugar consumption causes apparently little harm, notwithstanding the facts that in this infection large numbers of the parasites can be found in the blood for a considerably longer period than in the case of infections with the pathogenic trypanosomes, and that the non-pathogenic *T. lewisi in vitro* consumes just as much glucose as do the pathogenic forms. Similarly, if it is borne in mind that in the pathogenic infections of rats the trypanosomes are present in large numbers only about two days before death, and consequently the period during which large quantities of sugar is being consumed is very limited, it appears probable that the mere consumption of sugar hardly suffices to explain the death of the host.

The following are the conclusions :—

The loss of sugar in serum blood mixtures containing trypanosomes—*T. rhodesiense*, *T. congolense* or *T. lewisi*—at 37° C. was studied.

The sugar consumption in these mixtures is in great part due to the metabolism of the trypanosomes. Dead or dying trypanosomes cause no loss of sugar.

The sugar consumption of trypanosomes at 37° C. is considerable.

No differences were discovered in the amount of sugar consumed within 4 hours at 37° C. by the pathogenic trypanosomes on the one hand and *T. lewisi* on the other.

W. Y.

LOCATELLI (Piera). Sur le métabolisme du glucose dans la trypanosomiase. [**Metabolism of Glucose in Trypanosomiasis.**]—*C.R. Soc. Biol.* 1930. Nov. 21. Vol. 105. No. 31. pp. 449–451.

The author has estimated the blood sugar in guineapigs and rabbits infected with *T. equiperdum*. In two guineapigs the infection was progressive, without trypanolytic crisis, up to the death of the animals on the 22nd and 26th days, respectively. During the incubation period the blood sugar varied from 90 to 100 mgm. per 100 cc. ; after the appearance of parasites it fell sometimes as low as 60 mgm. and in one of the animals half an hour before death it was only 34 mgm.

In three guineapigs infected from rats there were definite trypanolytic crises and during these the blood sugar increased towards normal ; in two of them, which exhibited fairly long preagonal convulsions, the blood sugar fell to 0·38 and 0·41 mgm., respectively.

In rabbits the disease developed rather differently. In one animal in which only scanty parasites were found in the blood the sugar values were 90 to 120 mgm., and similar values were obtained in a second animal which had numerous parasites in its blood. A third rabbit gave values of 90 to 98 mgm. during the rather long incubation period, and 90 to 93 mgm. during the period that the blood contained numerous trypanosomes and only 18 mgm. during the agonal period.

The author correlates these changes in the blood sugar with degenerative lesions which he has regularly found in the islands of Langerhans in the pancreas of infected guineapigs. These lesions are described in detail. It appears that the islands of Langerhans are, at least in the guineapig, particularly sensitive to trypanosomal infections. [Possibly, as the author believes, these pancreatic lesions have something to do with the fall in the blood sugar values in experimental trypanosomiasis, but it is probably also necessary to take account of the enormous sugar consumption of the trypanosomes themselves, as has been shown by the reviewer and his colleagues (this *Bulletin*, Vol. 27, p. 237).]

W. Y.

KLIGLER (I. J.), GEIGER (A.) & COMAROFF (R.). **Effect of the Nature and Composition of the Substrate on the Development and Viability of Trypanosomes.**—*Ann. Trop. Med. & Parasit.* 1930, Oct. 22. Vol. 24. No. 3. pp. 329–345. With 3 charts in text. [4 refs.] [Dept. of Hyg. & Bact., Hebrew Univ., Jerusalem.]

After various unsuccessful attempts to grow trypanosomes *in vitro*, the authors decided to ascertain first the influence of various conditions of the substrate, such as pH, osmotic pressure, oxygen tension, etc., on their viability and multiplication.

The results of their experiments suggest the following conclusions :—

" 1. *T. evansi* is sensitive to hydrogen ion concentration. The optimum pH is on the alkali side (probably 7·4) ; the limiting pH is between 6·3 to 6·4 ; while the inhibiting pH is probably near 6·8.

" 2. *T. evansi* requires a minimum concentration of glucose, about 0·1 per cent. In the presence of oxygen the glucose is rapidly fermented with the production of lactic acid.

" 3. *T. evansi* is aerobic ; it survives longer under anaerobic than under aerobic conditions, but activity is greatly inhibited as evidenced by the acid production.

" 4. The optimal osmotic pressure is that of the tissues rather than that of the blood ; 0·08 /m. to 0·1 /m. or ¾ physiologic solution being more favourable than 0·12 /m.

" 5. NaCl. is more toxic than Na-Lactate ; the inhibitive effect of lactic acid is due, therefore, to the hydrogen ion concentration rather than the lactate.

" Since the completion of these experiments, Yorke, Adams and Murgatroyd (1929) published data which emphasise the significance of these results. These authors found that the survival of trypanosomes for any length of time is conditioned by their number. If the initial number of trypanosomes is large they die more rapidly than when the initial number is small. This difference is undoubtedly due to the more rapid acidification of the medium by the large number of organisms.

W. Y.

DOMINICI (Ada). Relazione fra concentrazione ionica e potere tripanocida del sangue normale e del sangue di cavia tripanosomizzata. Ricerche sperimentali. [**Relation between the Ionic Concentration and Trypanocidal Power of Normal Blood [of Rabbits and Guineapigs Blood of Guineapigs infected with Trypanosomes.**]—*Boll. Istituto Sieroterap. Milanese.* 1930. Aug. Vol. 9. No. 8. pp. 438–441. [4 refs.] [Hyg. Inst., Univ., Palermo.]

As regards the trypanocidal effect of normal blood the author found that when the reaction was between pH 6·8 and 6·4, there was no result during the first two hours of contact, but that after 8 hours' contact the trypanocidal action was quite definite. When the plasma was rendered more alkaline, pH 7·8–8·4, the trypanocidal power was much increased. *T. brucei* and *T. lewisi* were the species used.

In the second part of the experiment the author noted the pH of the plasma at four periods after the guineapigs had been inoculated with *T. brucei* : (1) At the beginning of infection before any trypanosomes are seen in the peripheral blood and before there is any loss of weight, i.e., four or five days after inoculation, the pH of the plasma is 7·2–7·3. (2) When trypanosomes begin to appear in the peripheral blood, the temperature starts to rise and swelling of lymph glands is visible (6–10th day), the pH was 7. (3) The period of " trypanolytic crisis " when the parasites disappear temporarily from the peripheral blood and settle in the internal organs (liver, spleen and lymph spaces), 10–14th day. (4) Late stages

with considerable loss of weight and trypanosomes are abundant in the peripheral blood. By this time the pH has come down to 6·6, and the animal is moribund. In other words, a fall in pH is accompanied by lowering of trypanocidal power, as shown by experiment and in the ordinary course of the infection.

H. H. S.

LINTON (Richard W.). **A Comparison of the Chemical Alterations in the Blood of Rats infected with Pathogenic and Non-pathogenic Trypanosomes.**—*Jl. Experim. Med.* 1930. Nov. 1. Vol. 52. No. 5. pp. 695–700. [5 refs.] [College of Physicians & Surgeons, Columbia Univ., New York.]

"Blood samples from rats infected with *Trypanosoma lewisi* give normal values for lipoid phosphorus, lecithin, CO_2 combining capacity, and liver glycogen.

"When these results are compared with the results of similar experiments with *T. equiperdum* infections, on the basis of the concentration of trypanosomes in the blood, it is found that the pathogenicity of the latter organism does not depend upon its numbers as affecting the blood, but that it must be in some other way injurious to the host. Whether the injury is due to a true toxin, an endotoxin, or mechanical interference is not yet known."

W. Y.

VILLELA (Eurico). Da occurrencia da Doença de Chagas nos hospitaes de Bello Horizonte e na população de seus arredores. [**Chagas's Disease in the Hospitals of Bello Horizonte and the Neighbouring People.**]—*Folha Med.* 1930. July 15. Vol. 11. No. 20. pp. 229–235. With 15 text figs. (1 map). [3 refs.]

The author examined 186 individuals presenting symptoms suggestive of Chagas's disease either by search for the parasite or by complement fixation. Search for the parasite was made in five ways: direct blood examination, section of tissues taken in life for the presence of leishmanial forms, haemoculture and xenodiagnostic methods, or by inoculation of a susceptible animal with the blood of the patient. Of the total examined 53 or 29 per cent. gave a positive complement fixation. A map is given [unfortunately on so small a scale that it conveys but little information] intended to show the localities of persons infected, and also sphygmographic tracings of some of the cardiac forms of the disease; photographs of goitrous cases are reproduced [one of which we recollect having performed the service for previous papers, the patient apparently thoroughly enjoying the process]. Sufficient evidence is produced to demonstrate that Bello Horizonte (Minas Geraes) is definitely an endemic focus of American trypanosomiasis.

H. H. S.

CHAGAS (Evandro). Forma cardiaca da Trypanosomiase Americana. [**The Cardiac Form of American Trypanosomiasis.**]—*Mem. Inst. Oswaldo Cruz.* 1930. Oct. Vol. 24. No. 3. pp. 89–125. With 79 figs. on 20 plates.

This article is a useful summary of previous papers on the subject by the same author (see this *Bulletin*, Vol. 25, p. 789, and Vol. 27, p. 838), together with 20 plates, depicting the trypanosome, the

Triatoma megista, the pathological condition produced in the heart in the acute and chronic forms, the physical signs and sphygmographic tracings of the various disturbances of rhythm. Fifty-nine of these are reproduced; the majority are clear but some are too small for study without a lens. [Unfortunately there is no list of references but this article does not appear to contain anything not already summarized in this *Bulletin.*]

H. H. S.

ZUCCARINI (J. A.). Etudes expérimentales sur le *Trypanosoma cruzi.* [**Experimental Studies on** *T. cruzi.*]—*C.R. Soc. Biol.* 1930. Oct. 16. Vol. 105. No. 27. pp. 113–115. [1 ref.]

MAGGIO and ROSENBUSCH, and KRAUS and ROSENBUSCH failed to find human beings infected with *T. cruzi* in the Argentine, but since 1924, MÜHLENS and others have succeeded. KRAUS and ROSENBUSCH explained the rarity of human cases and the absence of symptoms on the hypothesis that in Argentina the virus is attenuated.

Zuccarini states that the facts are as follows :—

1. *T. cruzi* in man has only been found accidentally in examinations made for malaria.
2. An experimental infection has been produced in man (Mühlens) by inoculation of a strain obtained from man or from indigenous Triatoma.
3. The white mouse is the most sensitive experimental animal.
4. No less than 13 species of Triatoma are found in Argentina.
5. The index of infection of the intestine of Triatoma is high.
6. Carriers of the infection have been found among dogs and armadilloes (*Dasypus hybridus*).

The author records the results of infecting mice, guineapigs and rabbits with various strains of the parasite isolated in the Argentine—the first from a Triatoma, the second from man, the third from a Triatoma, and the fourth from a child.

No definite differences were found in the receptivity of new-born and adult guineapigs. The infection proved fatal in young mice and rabbits, and was more certainly fatal in new-born animals than in those somewhat older.

W. Y.

ROBERTSON (Andrew). **Note on a Trypanosome Morphologically Similar to** *Trypanosoma cruzi* **Chagas, 1909, found in an Opossum,** *Didelphis marsupialis,* **captured at Tela, Honduras, Central America.** —*Eighteenth Ann. Rep. Med. Dept. United Fruit Company, Boston, Mass.* 1929. pp. 293–310. With 9 figs. [24 refs.]

The following summary is given :—

" 1. *T. cruzi* Chagas, 1909 was isolated from the blood of an opossum, *Didelphis marsupialis* captured at Tela, Honduras.

" 2. The trypanosome forms in the blood were morphologically similar to *T. cruzi* except that in some the nucleus was rather nearer the anterior or flagellar end of the body.

" 3. The developmental stages of the parasite were found in the heart muscle of the opossum.

" 4. *Cimex rotundatus,* the local bed bug or " chinche " of Honduras was successfully infected by feeding on the opossum. The *Cimex* were still infected three months later.

"5. A guineapig was successfully inoculated with blood from the opossum. The blood forms were identical with those from the opossum. The infection in the guineapig was transient lasting from two to two and a half weeks.

"6. A guineapig was inoculated with the infected dejecta of the *Cimex* and developed an infection in the peripheral blood one month from the date of inoculation.

"7. The organism was isolated in culture (on Wenyon's modification of Noguchi's blood agar medium) and the forms in culture corresponded closely to those in culture of a known strain of *T. cruzi*.

"8. An experimental guineapig showed trypanosomes in its blood one month after inoculation with the cultural forms. The infection also proved to be a transient one lasting for 21 days.

"9. Tela, Honduras is some 2,000 miles distant from what has hitherto been regarded as the endemic zone of this form of trypanosomiasis."

W. Y.

DIAS (Emmanuel). Da presença de formas de evolução do *Trypanosoma cruzi* Chagas, nos tubos de Malpighi do barbeiro. (Nota prévia.) [**Evolution Forms of** *Trypanosoma cruzi* **in the Malpighian Tubes of** *Triatoma megista*.]—*Mem. Inst. Oswaldo Cruz.* 1930. Oct. Vol. 24. No. 3. pp. 183–185. With 3 plates.

The author dissected numerous specimens of the vector of American trypanosomiasis, fixed the parts in a modified Schaudinn's fluid, mounted them in paraffin and cut serial sections. In addition to the forms already described by CHAGAS, BRUMPT and others, as present in the stomach and intestine, the author found in some of the specimens crithidial forms in large numbers in the Malpighian tubes, especially congregated in the swollen terminal portion, as depicted in the plates which accompany the paper.

H. H. S.

MAURICE (G. K.). **The History of Sleeping Sickness in the Sudan.**—*Jl. Roy. Army Med. Corps.* 1930. Sept. & Oct. Vol. 55. Nos. 3 & 4. pp. 161–174 ; 241–259. With 5 text figs., 1 map & 1 chart.

This article is an interesting and popular account of the history of sleeping sickness in the Sudan ; it contains nothing new and requires no special notice.

W. Y.

SICÉ (A.) & BOISSEAU (R.). Trypanosomiase humaine associée à différentes infections. [**Human Trypanosomiasis associated with Other Infections.**]—*Bull. Soc. Path. Exot.* 1930. Dec. 10. Vol. 23. No. 10. pp. 1011–1014. [3 refs.] [Pasteur Inst., Brazzaville.]

Clinical accounts are given of three cases of sleeping sickness in which the condition was complicated by the development of secondary infections, viz., leprosy, amaas and tetanus, respectively.

W. Y.

MESNIL (F.). Sur l'adaptation des trypanosomes à l'homme. [**Adaptation of Trypanosomes to Man.**]—*Bull. Soc. Path. Exot.* 1930. July 9. Vol. 23. No. 7. pp. 719–721. [4 refs.]

This article has already been published elsewhere and fully noticed in this *Bulletin* (Vol. 27, p. 807).

W. Y.

PLAGUE.

THORNTON (Edward N.). **A Report on an Investigation into Plague in the Protectorate of Uganda.**—pp. iv+33. 1930. Entebbe.

This Report gives the results of an enquiry into the plague conditions of Uganda during a visit to that country in June and July 1930 by the author.

There have been 52,907 reported deaths in the period from 1910 to 1930; the numbers range from 531 in 1924 to 5,199 in 1929. The reported cases of plague are mostly bubonic but it is believed that a considerable number of deaths from septicaemic and pneumonic plague have escaped record. The disease is chiefly prevalent after the heavy rains.

The spread of plague during the past 24 years has been mainly associated with the ramifications of the cotton industry. The problem is essentially a rural and not an urban one, since cotton, which is the chief agricultural product in Uganda, is cultivated by the natives on many thousands of small plots scattered over the country. The primitive conditions of life in the rat-infested native huts and an excellent modern system of communications form a combination of circumstances which favours the spread of plague not only within but beyond the confines of the country. The author of the Report thinks that a co-ordinated survey of plague in this region of East Africa, including Kenya Colony and Tanganyika Territory, should be undertaken.

The natives have come to regard the roof-rat, a local variety of *R. rattus*, as the distributor of the infection, and this is undoubtedly the common plague rodent to-day in Uganda. *R. couchae ugandae*, which is also a house-rat, has been associated with plague outbreaks in the past, and *Arvicanthis abyssinicus*, a field rodent, has also been found infected with plague. The rôle of other field rodents is uncertain but is under suspicion.

X. cheopis and *X. brasiliensis* are the chief fleas that infest the rodents. The latter species is the one most commonly found on rodents in the country districts, where, on the contrary, *X. cheopis* is relatively rare. In Kenya Colony, likewise, *X. brasiliensis* is the common flea on rats caught in native huts, and *X. cheopis* is more numerous on the rodents in towns. The meteorological conditions in Uganda are stated to be exceptionally favourable for the multiplication of fleas, and incidentally too for the infestation of native huts by rats, and for the spread of plague in general. The Medical Officer of Health for Kisumu in Kenya, in an investigation which lasted from August 1926 to July 1927, found that rat-fleas were carried both in hides and in bags of cotton seed. The examination of 1,434 bags of cotton seed from Uganda gave an average of 11·5 per 100 bags; these included 9 *X. brasiliensis*, 154 *X. cheopis*, 1 *P. irritans*, and 1 *C. felis strongylus*.

Anti-plague inoculation is not unpopular, but the author of the Report recommends that inoculation should be restricted to close contacts of patients, the occupants of premises in which plague-infected rodents have actually been found, and the disinfesting staff. He thinks that the quarantining of patients is necessary in order to obviate risk from a terminal plague pneumonia, but that the quarantining of contacts is not justified; the unpopularity of this measure limits its value. He suggests as a substitute for burning and de-thatching,

which are unpopular measures, treatment of the infected native huts by " cyanogas " dust. This substance is stated by the manufacturers to be calcium cyanide, which, on exposure to air, gives off hydrocyanic acid gas, leaving a harmless residue of slaked lime. The laying, with due precautions, of baits of strychnine-poisoned wheat is recommended as being a most effective rodent-killing agent in areas where wheat is not grown. Notes on the method of applying " cyanogas " dust and on poisoned baits for rodents are given in two appendices. [The inclusion of a sketch map of Uganda and the adjoining territories would have made the topographical references more readily intelligible to the reader.] G. F. Petrie.

DANY (G.). Quelques considérations sur l'épidémie de peste du Sous (Mars-Août 1929). [**Plague in Sous.**]—*Rev. Méd. et Hyg. Trop.* 1930. Nov.–Dec. Vol. 22. No. 6. pp. 261–265. [2 refs.]

This paper refers to 357 cases of plague which were seen in Sous from March to August 1929. This did not include all the cases, as it was difficult to obtain accurate statistics. In the main it was an epidemic of bubonic plague. In one small area cases of pneumonic plague occurred, all rapidly fatal. There were also patients with septicaemic plague who died in two or three days without buboes, but showing many painful glands. Some rats were examined by Dr. DIOT and by the late Dr. AURIAT, and found to be infected ; but there was no plague among other rodents very common in the district.

J. H. Tull Walsh.

CAZANOVE. Recherches sur les causes de la persistance de la peste au Sénégal. [**Causes of Persistence of Plague in Senegal.**]—*Bull. Office Internat. d' Hyg. Publique.* 1930. Nov. Vol. 22. No. 11. pp. 2103–2107.

This investigation began in January 1929 under the Director of the Laboratory of Bacteriology of Senegal at Saint-Louis. A motor-car was employed for travelling through the villages. Tables are given of the rodents and fleas found in the districts visited. About 3,000 rodents were examined ; only six showed plague bacilli. The rodent concerned was *M. rufinus*, caught in two villages. One of these villages was free from plague ; in the other there were two cases. Of the large number of fleas captured, 105 were *X. astia*. All the rest were *X. cheopis*. J. H. T. W.

i. GRAHAM (J. D.). La peste dans l'Inde Britannique. [**Plague in British India.**] (I. Recherches sur la peste, faites à l'Institut Haffkine, de Bombay [ANDERSON & DUNN]. II. Résumé des travaux accomplis au cours des recherches sur les puces des rats dans la Présidence de Madras [RUSSELL, KING & PANDIT]. III. Etude sur les puces du rat dans le Port et la Ville de Rangoon [JOLLY].)—*Bull. Office Internat. d' Hyg. Publique.* 1930. Nov. Vol. 22. No. 11. pp. 2088–2098. [3 refs.]

ii. ——. Documents statistiques sur la peste dans l'Inde Britannique. —*Ibid.* pp. 2099–2100. With 2 charts.

i. A useful anti-plague serum was obtained by Dr. NAIDU from rabbits injected with *Past. pestis*. Larger quantities were obtained

from sheep and calves. These sera were tested on rats and rabbits and the results were sufficiently encouraging to justify their application to man on a large scale. Experiments were made on the transmission of plague by *X. cheopis*, *X. astia* and *X. brasiliensis* in Bombay, and all three were shown to be transmitters of plague. Similar investigations were made on rats and fleas in Madras and Rangoon [this *Bulletin*, Vol. 24, p. 932 (GOYLE)]. The chemotherapy of plague was studied and it was found that parachloromercuro-phenol destroyed *Past. pestis*, *in vitro*, in a dilution of 1 in 400,000,000, in 24 hours. Other work was done on immunity and on the biological reactions of *Past. pestis*. Cereals in various places were examined in order to discover how far they were infested with fleas or flea larvae. Only on two occasions was infestation discovered.

ii. Contains a chart of plague—1896–1927—and one showing the distribution of plague by Provinces—1897–1927.

J. H. T. W.

DE FIGUEIREDO (J. M. Pacheco). Relatório dos serviços executados na peste pneumónica em Nagoá e Raçaim. [**Measures against Pneumonic Plague at Nagoá and Raçaim (Portuguese India).**]—*Bol. Ger. Med. e Farmacia.* Bastora. 1930. Jan.–Sept. Ser. 14. Nos. 1–9. pp. 59–71.

A small outbreak of pneumonic plague occurred in April [? 1930] in Portuguese India. As usual, the earliest case was bubonic, death being due to pulmonary complications, and again as usual the early cases were wrongly diagnosed. The first, bubonic, patient was thought to be suffering from "erysipelas and lymphangitis"; the first pneumonic patient, a man of 60 years, was thought to have died of senile debility and bronchitis, and subsequent patients from remittent fever or influenzal pneumonia. Alarm at the suddenness of these deaths led to a delegate being sent from Salsette, and he, seeing a patient very ill with broncho-pneumonia and copious haemorrhagic sputum, had cultures made and *Past. pestis* was found in abundance. Steps were immediately taken; patients and 138 contacts were isolated, anti-plague serum obtained from the Pasteur Institute was injected into 47 of the latter in doses of 10 or 20 cc. Some of the patients were isolated in their homes, and the districts were divided into zones each with a military cordon to prevent intercommunication. The usual disinfecting procedures were also carried out. The success of the measures taken is evidenced by the fact that the total attacked was 6, of whom 3 died.

H. H. S.

LONG (John D.). **Antiplague Campaign in Guayaquil and Vicinity.**—*Public Health Rep.* 1930. Nov. 21. Vol. 45. No. 47. pp. 2880–2887. [1 ref.]

This report deals with the destruction of rats by trapping, etc. In November 1929 one rat in 150 was infected with plague. The last plague rat was found on March 26th, 1930. 6,500 rats have since been examined without finding any infection among them. Plague has been present in Guayaquil for 22 years and over 7,200 cases have been recorded; but the port of Guayaquil is no longer a menace to other countries through international commerce. "If by October 1st,

1930, no further cases of human or rat plague shall have occurred the port of Guayaquil may be reported to the Pan-American Sanitary Bureau, in accordance with the terms of the Pan-American Sanitary Code, as a ' clean port ' of Class A."

J. H. T. W.

ANDO (K.), KURAUCHI (K.) & NISHIMURA (H.). **A New Plague Endemic Area in the North-Eastern Part of Inner Mongolia. Plague Studies I.**—*Kitasato Arch. Experim. Med.* 1931. Jan. Vol. 8. No. 1. pp. 24–38. With 1 chart in text. [12 refs.] [Kitasato Inst. for Infect. Diseases, Tokyo.]

A description is given of a plague infection which was in all probability a new one for the area concerned and which dated from about the year 1924. The reports indicate that there had been present every summer an infectious disease with bubo, headache and high fever which destroyed sometimes whole families and sometimes hamlets. There is reason to suppose that the animal concerned in transmission was the suslik rather than the rat. W. F. Harvey.

LEAGUE OF NATIONS MONTHLY EPIDEMIOLOGICAL REPORT. 1930. May 15. Vol. 9. No. 5. pp. 203–218. With 5 maps & 1 chart. —**General Review. Plague in 1929–30.** [In parallel French and English.]

This bilingual Report contains much interesting information concerning plague in many countries during the period 1929–30 and previous years. Statistics are given from Africa, Asia, Java, Europe and America. The chart on the cover shows the deaths from plague in Northern India from 1922 to 1930, with a marked reduction during the last four years. J. H. T. W.

FONQUERNIE (J.). Considérations sur l'épidémiologie de la peste. [**Epidemiology of Plague.**]—*Bull. Soc. Path. Exot.* 1930. Nov. 12. Vol. 23. No. 9. pp. 899–901. [Municipal Bureau of Hygiene, Antananarivo.]

The author believes that man may be a primary or independent carrier of plague as suggested by LEGER [this *Bulletin*, Vol. 24, p. 34]. As the result of numerous observations it is known that very often there is no relation between an epidemic and an epizoötic ; the former may exist before the second or may occur without any mortality among rodents, before, during or after. J. H. T. W.

GOLOW (D.) & KNJASEWSKII (A.). Ueber die Rolle der Ektoparasiten eines leeren Nestes des Ziesels (*Citellus pygmaeus*) in der Epidemiologie der Pest. [**Ectoparasites in Empty Suslik Nests and Plague.**]—*Zent. f. Bakt.* I. Abt. Orig. 1930. Oct. 20. Vol. 118. No. 5/6. pp. 277–283. [1 ref.] [State Inst. for Microbiol. & Epidemiol., Saratov.]

In the spring and summer of 1929 there was a severe epizoötic of plague among the susliks in the district of Ural and Gurjew, A.S.S.R., reaching to a natural boundary, the river Ural. Fifteen susliks found

dead were infected with plague. Fourteen were shot, and of these two were infected. One of these showed an inguinal bubo and nodules in the spleen and liver. Several nests were examined and the usual flea parasites were found [see this *Bulletin*, Vol. 24, p. 33 (WAGNER & JOFF)]. J. H. T. W.

RUSSO (Canio). Recherches expérimentales sur l'épidémiogenèse de la peste bubonique par les insectes. [**Experimental Transmission of Plague by Insects.**]—*Bull. Office Internat. d'Hyg. Publique.* 1930. Nov. Vol. 22. No. 11. pp. 2108–2120. [1 ref.]

The author records the results of experimental infection of certain insects. The larvae of flies fed on the bodies of infected animals suffer no ill effects and complete their biological cycle. Large numbers of plague bacilli are found in their intestines where they multiply. They live on even after the larvae have been removed from the infected food; after five days they are still present but in smaller numbers. The imago emerges but dies quickly, usually in a few hours, from bacteriological infection. On some plague-infected rats *Dermestes lardarius* and *Hister cadaverinus* were found. They did not contain any plague bacilli. Mites living on infected rats may become infected and the bacilli survive for varying periods. The author considers that flies and mites may easily infect cereals, etc., and thus spread the infection of plague [*v.* this *Bulletin*, Vol. 23, p. 617 (GOSIO)]. J. H. T. W.

KISTER. Die Rattenpestdiagnose in Hamburg. [**Diagnosis of Rat Plague in Hamburg.**]—*Zent. f. Bakt.* I. Abt. Orig. 1930. July 28. Vol. 117. No. 7/8. pp. 433–440. With 6 text figs. [14 refs.] [State Hyg. Inst., Hamburg.]

The experience of a large port like Hamburg in the prevention of the entrance of plague is especially valuable. In the years 1900 to 1929 there were examined 98,830 rats and mice from 6,466 ships. The bodies of the rats are first searched for fleas: *Xenopsylla cheopis* provided 93·8 per cent. of the species. As regards species of rats, the percentages in the earlier years were *M. rattus* 97·2, *M. decumanus* 2·8, which proportion, however, has altered somewhat and was in 1929: *M. rattus* 69·2, *M. alexandrinus* 18·5 and *M. decumanus* 12·3. The next examination is of general macroscopic appearances which, when positive, are, marked congestion of vessels of the connective tissue, enlargement of glands with surrounding haemorrhages, enlargement of spleen and liver, and sometimes small necrotic areas in these organs and the lungs. Films are made from the organs to show polar-staining short bacilli. Other affections, such as those of Friedländer bacilli, paratyphoid group bacilli, etc., may give similar macroscopic appearances and diagnosis may be very difficult in decomposed animals. In such decomposed material the degeneration forms of plague are of great assistance, with their characteristic ring and disc forms, especially if obtained from the inguinal glands. Bacteria of the haemorrhagic septicaemia group or pseudotuberculosis of rodents were not met with, but would be capable of causing considerable difficulty in diagnosis. Cultures are made from the organs of rats suspected of plague and incubated at 32° C. Endo-agar is often useful when dealing with

decomposed material. Colonies are examined by Gram staining, hanging drop, and by subculture into glucose bouillon for gas production, which, of course, should not occur. Agglutination tests are somewhat difficult owing to the difficulty of procuring good high titre sera. From the organs in which typical polar-staining organisms have been found, inoculations may be made of:—3 rats subcutaneously with organ suspension, 1 rat and 1 guineapig with a piece of an organ in a pocket of skin, and 2 guineapigs cutaneously on the abdomen freed from hair. It requires 5 to 6 days to make a complete examination, especially with decomposed material. A report may be given, even in difficult cases, after 45 hours on the results obtained macroscopically and microscopically in the inoculated animals and this will afford an important saving of time in carrying out necessary disinfection.

W. F. Harvey.

Martínez Vinueza (Juan J.). Peste eruptiva (viruela pestosa) y angina pestosa; formas raras de la peste. [**Eruptive Plague (Plague-Pox) and Anginose Plague.**]—*Bol. Oficina Sanitaria Panamericana.* 1930. Oct. Vol. 9. No. 10. pp. 1189–1195.

Plague has persisted in Guayaquil since its recognition in 1908, though the measures undertaken have greatly reduced its incidence. The majority are typical bubonic cases, but occasionally anomalous symptoms appear and cases illustrative of two of these are recorded. The first is designated variolous plague and is characterized by the appearance of a rash, usually on the sixth day, macular in character, discrete and affecting first the face and arms, soon involving the whole body, and becoming petechial, to the size of a lentil, then papular, and on maturation these papules come to contain yellowish purulent material, drying up in a few days in mild cases and leaving no permanent signs. In severe cases death occurs. Details of two are given; one died on the ninth day, the other passed into a typhoid state on the tenth and died on the twentieth day. Among 727 cases of plague the author has seen 26 such, and of these 24 died [see this *Bulletin*, Vol. 23, p. 181 (Kirk)]. Of the anginose form there are two varieties, though both are due to localization of the organism in the throat. In the one—primary anginose plague—the disease starts with a sore throat from primary localization of the organism there, much local pain, high temperature and shivering, together with the general signs of plague, headache, prostration, etc. The fauces are soon covered with a greyish exudate and there is cervical adenitis. In the other—secondary anginose plague—the condition is less grave and the prognosis more favourable and it is ascribed to a submaxillary bubo "spreading to involve the throat." Details of a primary case are given, death taking place on the fifth day with signs of intense toxaemia and asphyxia. The frequency with which such cases were met with is not stated.

H. H. S.

Assali (J.) & Popoff (S.). Adéno-phlegmon à bacilles pesteux et à évolution chronique. [**Chronic Phlegmonous Adenitis with Plague Bacilli.**]—*Bull. Soc. Path. Exot.* 1930. Nov. 12. Vol. 23. No. 9. pp. 997–998. [Native Hosp., Dakar.]

The writer describes a case of chronic bubonic plague in a young, well-nourished native of Senegal. The illness was a month old when the patient was seen. It began with a suppurating bubo in the right groin

which the man opened with a knife. As it got worse the patient came to the dispensary. The right groin contained a tumour as big as the head of a foetus, hard and not very painful. On microscopical examination plague bacilli were found. The bubo was dressed with anti-plague serum and during four days the patient received 320·0 cc. of anti-plague serum. After a month the mass was still foetid and showed several sinuses. On September 26th six large glandular masses were removed from the groin. The temperature fell from 39·2° C. to normal soon after the operation. In one of the glands sent to the Pasteur Institute plague bacilli were found.

J. H. T. W.

COUVY (L.) & POPOFF. Essais de traitement de la peste par le bactériophage. [**Treatment of Plague with Bacteriophage.**]—*Bull. Soc. Path. Exot.* 1930. June 11. Vol. 23. No. 6. pp. 618–629. With 11 charts.

During 1929, 145 plague cases were admitted into the hospital for natives at Dakar. June, July and August showed the highest number of cases and of deaths. Eighty-seven of the patients died. There were 126 cases of bubonic plague, 9 of septicaemic plague and 10 of pulmonary plague. The bubonic cases that could be treated during the first 24 or 48 hours of the attack seemed to benefit from injections of anti-plague serum —320 cc. given in four intravenous injections of 80 cc. Among the more serious cases the serum did not appear so active. The bacteriophage was reserved for severe cases and was given by injection either into the bubo, into the subcutaneous tissue or intravenously. 21 severe cases were treated, with 15 recoveries—a better proportion than among milder cases treated with serum. Ten out of the 21 cases are described in detail with charts.

J. H. T. W.

GIRARD (G.). Considération sur le traitement de la peste par le bactériophage (à propos de mémoire de MM. Couvy et Popoff). [**Treatment of Plague by Bacteriophage.**]—*Bull. Soc. Path. Exot.* 1930. Nov. 12. Vol. 23. No. 9. pp. 936–942. [2 refs.] [Pasteur Inst., Antananarivo.]

This paper is suggested by the work of MM. COUVY and POPOFF who reported success with bacteriophage treatment of plague [see above]. Returning from France in 1926, the author brought with him a large supply of anti-plague bacteriophage prepared by ELIAVA in the laboratory of M. DUJARDIN-BEAUMETZ, Paris. The strain was that of d'Herelle. Its virulence was such that guineapigs could receive 6·0 cc. without ill effects. At the same time the Director of the Sanitary Service, Madagascar, forwarded to the author several boxes of pestiphage which were received from Alexandria also from d'Herelle source. Both these products were used in Antananarivo from June 1926. After the death of a native doctor and ten others in a village 20 kilometres from Antananarivo, the author and Dr. PIC made an enquiry and learned that the wife of the doctor and a hospital nurse were in danger as contacts. Bloody sputum found by the bedside of the corpse confirmed the diagnosis of primary pulmonic plague. Four days after isolation the wife and nurse showed symptoms of the disease, and the local doctor injected 2·0 cc. of pestiphage into each lung in both cases. The author saw them the following day and gave a bilateral pulmonary injection of 1·5 cc. of bacteriophage

to each patient. After the treatment the temperature in both cases fell—36·6° and 36·5°—and they seemed better. Four days after these signs of improvement the nurse, Raketam, died with sputum full of plague bacilli. A man servant, Rakotolahy, who had attended the nurse was taken ill the day after her death and received an injection of 1·0 cc. of pestiphage in each lung on the 14th June. As his condition was grave on the 17th 4·0 cc. of bacteriophage were injected into the right lung, which seemed the most affected. This man recovered. Later another opportunity came for trial of this treatment. In the district of Soavinandriana between June 25th and July 5th Dr. GUILLINY treated nine cases of pulmonary plague under the best conditions. They all died. At Antsirabe Dr. MONNIER injected 2·0 cc. intravenously into an infirmary attendant who died without improvement. A few other cases were treated without benefit. On examination the pestiphage and the bacteriophage were found to have lost their lytic power *in vitro*; the virulence had disappeared and D'HERELLE has stated that only bacteriophage of maximum virulence is of any value. After 3 months the bacteriophages were useless. They should evidently only be used when quite fresh from the laboratory [see this *Bulletin*, Vol. 27, p. 737 (FLU ; DOORENBOS)]. J. H. T. W.

KURAUCHI (K.). **Differentiation of *B. pestis* from Allied Organisms by Means of their Biological Properties. Isolation of a Strain of Plague-like Bacillus from a Suslik. Plague Studies 3.**—*Jl. Oriental Med.* 1930. June. Vol. 12. No. 6. [In Japanese. English summary pp. 49–52.]

——. **Differentiation of *B. pestis* from Allied Organisms by Means of their Biological Properties. On a Plague Bacillus-like Strain isolated from a Suslik. Plague Studies III.**—*Kitasato Arch. Experim. Med.* 1931. Jan. Vol. 8. No. 1. pp. 45–59. [35 refs.] [Hyg. Inst., S. Manchurian Rly. Co., Dairen.]

A plague-like bacillus was isolated from a suslik which showed typical post-mortem appearances of acute plague. It differed from typical plague bacilli only by being non-pathogenic and by its want of formation of viscid colonies on agar. The isolation of this organism was made the occasion for making comparative studies on a number of other strains of organisms which comprised 29 of *Past. pestis*, 13 of the haemorrhagic septicaemia group and one of *Past. pseudotuberculosis rodentium*. As a result of these studies it was concluded that the strain of plague-like organism isolated was a true plague bacillus. W. F. Harvey.

NISHIMURA (H.). **The Susceptibility to Plague Infection of Susliks found in Inner Mongolia (*Citellus mongolicus ramosus* Thomas). Plague Studies 5.**—*Jl. Oriental Med.* 1930. July. Vol. 13. No. 1. [In Japanese. English summary p. 7.] [Hyg. Inst., S. Manchurian Rly. Co., Dairen.]

This investigation was begun with the hope of determining the susceptibility to *Past. pestis* of all the small mammals found in Inner Mongolia, but this was found to be impracticable owing to difficulty of procuring them and because many of the animals died in captivity. Only susliks could be transported in perfect health to Dairen. These animals were found to be very susceptible to plague infection either from infected corpses of susliks or by inoculation of plague bacilli.

J. H. T. W.

GOMILA (Frank R.). **A Characteristic Exanthem in Epizootic Plague and the Experimental Reproduction of this Lesion in the Guinea Pig.**—*Proc. Soc. Experim. Biol. & Med.* 1930. June. Vol. 27. No. 9. pp. 918–919. [Municipal Health Dept., New Orleans.]

An epizootic of plague among rats gave the opportunity for study of approximately 150,000 of these animals. A discoloration of the feet was noticed in plague rats which varied from a pink to salmon colour. It was clear cut and had a distinct line of demarcation. The extent of this discoloration varied from mere " pink feet " in slight affections to one which might cover the extremities and even appear upon the abdomen and thorax. It suggested somewhat discoloration such as is seen in carbon monoxide poisoning. Only 25 per cent. of infected rats failed to show " pink feet " and there was evidence to show that these were animals which had only been recently infected. A definite test was made in guineapigs of the significance of this sign. Two hundred and fifty guineapigs were variously inoculated with material from plague rats all of which developed plague and 95 per cent. of which demonstrated the characteristic exanthem. This exanthem, then, may be described as typical in rodent plague.

W. F. Harvey.

SATHE (R. G.). **Notes on the Pathological Lesions observed in Domestic Animals experimentally infected with Plague.**—*Indian Vet. Jl.* 1930. Oct. Vol. 7. No. 2. pp. 142–147.

Experimental infection in sheep, calves and bullocks with virulent cultures of plague injected intravenously produces lesions very similar to those in cattle and sheep suffering from haemorrhagic septicaemia. From the pathological lesions and the presence of bipolar organisms in the animals the identity of the causal organisms cannot be established. No diagnosis of plague can be made in an animal unless serological and immunological tests are carried out.

J. H. T. W.

AKULOWA (R. F.) & RUDNEW (G. P.). Das Blutbild bei experimentell erzeugter Pest. [**The Blood in Experimental Plague.**]—*Zent. f. Bakt.* I. Abt. Orig. 1930. Dec. 8. Vol. 119. No. 1/2. pp. 39–48. With 13 text figs. [10 refs.]

While working during an epidemic of plague in Sawjetnoje, North Caucasus, in 1929, the authors became interested in the blood changes in plague-stricken marmots (*Citellus pygmaeus*). Later experiments were made in the laboratory on 26 marmots infected experimentally with plague, 4 being used as controls. These infected animals died in about eight days. The blood of the infected animals showed a sharp rise in the number of leucocytes up to 20,000, or nearly three times the number estimated for a healthy marmot (7,000 to 9,000). Neutrophiles decreased and lymphocytes increased and the former often showed signs of degenerative granulation. The text contains photographs showing the condition of the blood and phagocytosis.

J. H. T. W.

COMPTON (Arthur). Etudes sur l'immunité dans la peste expérimentale. [**Studies on Immunity in Experimental Plague.**]—*Ann. Inst. Pasteur.* 1930. Dec. Vol. 45. No. 6. pp. 754–767. With 3 charts in text. [8 refs.]

Experiments on rats have led the author to the conclusion that a specific serum appears to be at the present time the most efficacious mode of treatment of plague, whereas a specific bacteriophage subcutaneously injected is without value. On the other hand, administration of bacteriophage subcutaneously before the infection, that is to say, as a prophylactic, is of definite value. Two injections are better than one and three are still better. A formalinized bacteriophage also gives good prophylactic results. Sensitization of the animals has been noticed as a result of bacteriophage immunization, but this disappears if the injections are repeated. No bacteriophage corpuscles could be found after injection in the blood or the stools and this is probably due to their suppression by the tissues of the animal during the course of immunization. Bacteriophage immunity is, then, not protobiotic: it is essentially antibacterial and antitoxic.

W. F. Harvey.

COUVY (L.) Note sur un principe lytique pour le bacille de Yersin, isolé de selles de convalescents de peste. [**Note on a Lytic Principle for the Plague Bacillus from Stools of Convalescents.**]—*Bull. Soc. Path. Exot.* 1930. Nov. 12. Vol. 23. No. 9. pp. 943–950. [1 ref.]

A portion of stool is mixed with 20 times its volume of ordinary bouillon and brought to pH 7·8. This mixture is kept for 24 hours at 37° C., filtered through paper sprinkled with infusorial earth and then through an L3 or L5 Chamberland candle. After a second incubation for 48 hours the filtrate is again filtered. With this filtrate tests for lysis have been carried out and also trial of therapeutic efficacy. The lytic power of the filtrate was established by test on suspensions of *Past. pestis* in normal salt solution and in peptone water and an exaltation of its virulence was found to take place as a result of repeated addition of young cultures. Therapeutically some striking results were obtained in severe cases of plague and cures are claimed from the use of this lytic principle. The best results were obtained with a very active filtrate, which had been subjected to a minimum of passages *in vitro*. It was found that even although strains had with many passages attained great virulence, their activity *in vivo* was not of a high degree.

W. F. Harvey.

BURGESS (A. S.). **Virulence, Immunity and Bacteriological Variation in Relation to Plague.**—*Jl. Hygiene.* 1930. June. Vol. 30. No. 2. pp. 165–179. With 9 figs. on 2 plates. [8 refs.] [Med. Research Inst., Accra.]

The medium preferred for culture was one in which the whole of the meat was included instead of merely an extract. This was neutralized to phenol phthalein and 40 per cent. excess of alkali added. It gave heavier cultures. African pouched rats (*Cricetomys gambianus*)

were found to be very suitable test animals, as they are large, stand captivity well and are extremely susceptible. An experiment designed to test the relative immunizing values of different types of vaccine showed that a broth-grown culture was superior to an agar-grown culture and that carbolized spleen pulp from an infected rat, containing a true "body strain," was more effective than either. This last type of vaccine is complicated and has little practical value.

Several experiments are described which demonstrated loss or reduction of virulence of *Past. pestis* by passage through immune or partially immune rats. Such a culture, of reduced virulence, could have its virulence restored by successive passages through normal rats, but it was noteworthy that the number of passages required was greater than for bacilli which had been attenuated by long cultivation. Three types of plague colony were met with and these were connected by intermediate types. They were (*a*) the small fringed type which is the typical form, (*b*) the simple round type without fringe, and (*c*) the large, irregular type. In the case of old avirulent strains it was found that the bacilli tended to become longer and might cohere in filaments of considerable length. The cultures used in this work, unlike those used in earlier experiments, lost their virulence in a few months when kept at room temperature, an effect which may really have been due to a higher temperature of preservation.

W. F. Harvey.

La Rosa (Gaetano). L'azione della bile sul bacillo della peste. [**The Action of Bile on** *Past. pestis.*]—*Giorn. di Batteriol. e Immunol.* 1930. Dec. Vol. 5. No. 12. pp. 1768–1780. [2 pages of refs.] [Inst. of Hyg. & Bact., Univ., Catania.]

The object of this research was to determine the effect of bile on the culture, morphology and virulence of the plague bacillus. It was found that the organism grew luxuriantly in pure bile whether fresh or sterilized and in bile broth of varying strength. In the fresh bile and in the stronger concentrations of bile broth the plague bacillus undergoes very special change in its morphology and a great diminution in virulence. This diminution, however, is of temporary character and the virulence is quickly restored by animal passage. It is the same with the morphological changes, for the original form is rapidly recovered by subculture in ordinary broth media.

W. F. Harvey.

Tinker (I. S.) & Rudnew (G. P.). Zum Studium ueber die Lebensfähigkeit des *Bac. pestis.* [**Vitality of** *Past. pestis.*]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1930. Oct. Vol. 34. No. 10. pp. 554–559.

The vitality of *Past. pestis* was studied chiefly from the point of view of its resistance to reagents used in blood examination. Giemsa solution of strength 1 or 2 drops per cc. had no lethal effect on unfixed preparations. Hayem's fluid and Turk's fluid were also tested. Hydrochloric acid, commonly used in haemoglobin estimation, was without effect in strength 0·05 per cent. but killed off plague bacilli in 45 minutes at 0·5 per cent. A thick drop of blood, containing bacilli, dried and stained with Giemsa, showed living organisms even 2 hours after removal.

W. F. Harvey.

MITCHELL (J. A.) with Appendices by PIRIE (J. H. Harvey), RHODES (W. F.) & POWELL (W.). **Epizootic among Veld Rodents in De Aar and Neighbouring Districts of the Northern Cape Province.**—*Jl. Hygiene.* 1930. Feb. Vol. 29. No. 4. pp. 394–414.

A previous account of this epizoötic which appeared in another journal has been already noticed [this *Bulletin*, Vol. 27, p. 740]. The present paper and especially the appendices contain more detailed information as to the nature of the disease and the causative agent. During the summer months of 1928–29 an epizoötic occurred in De Aar and neighbouring districts, mainly affecting Namaqua gerbilles (*Desmodillus auricularis*). Many of the animals showed a haemorrhagic septicaemia, the causative organism of which appeared to be a *Pasteurella* smaller than *Past. pestis*. A description of this organism is given and the name *Past. desmodilli* is suggested. It is highly pathogenic for rabbits, less so for guineapigs, and non-pathogenic for rats and fowls. It was found by Rhodes to be highly pathogenic for Lobengula gerbilles (*Tatera lobengula*) from Cape Town, but less virulent for those from Johannesburg. Dr. Rhodes gives an account of the pathology. Dr. Powell gives an interesting summary of the differences between this disease and ordinary plague in veld rodents. In the latter the animals rarely show signs of illness before death and there is no alarm or disturbance of the rodent colonies. In the De Aar epizoötic the animals appeared to suffer from pains in the stomach, with fever, restlessness and periods of drowsiness—death taking place after some hours of illness. The rodent colonies are disturbed and alarmed. The healthy rodents run about excitedly and the sick animals wander away aimlessly and may travel some distance before dying. The mortality is very rapid and the infection remains active for a few weeks only. In typical plague the mortality is, as a rule, not very rapid and the infection usually remains active for from six to twelve months. J. H. T. W.

IWANOWSKY (N.) & SASSYKINA (T.). Die Schardinger-Reaktion bei der Differentialdiagnose des *B. pestis* und *B. pseudotuberculosis rod.* Pfeifferi. [**Reduction of Methylene Blue as a Differential Test between** *Past. pestis* **and** *Past. pseudotuberculosis rodentium.*]—*Rev. Microbiol., Epidémiol. et Parasit.* 1930. Vol. 9. No. 1. pp. 72–76. [16 refs.] [In Russian. German summary pp. 132–133.] [Inst. of Microbiol. & Epidemiol., Saratov.]

—— & ——. Die Anwendung der Schardinger-Reaktion zur Differentialdiagnose von *Bacillus pestis* und *Bacillus pseudotuberculosis rod.* Pfeifferi.—*Zent. f. Bakt.* I. Abt. Orig. 1930. July 28. Vol. 117. No. 7/8. pp. 535–539. [16 refs.] [State Inst. of Microbiol. & Epidemiol., Saratov.]

The points investigated were the influence of the concentration of the reagent and the temperature on the velocity of the reactions, the influence of light and the age of the culture. Reduction starts at the bottom of the test tube and extends upwards. Test tubes in series are filled with 3 cc. of a suspension of a 2-day culture in normal salt solution. The reagent had the composition :—Saturated alcoholic methylene blue, 5 ; formaldehyde, 5 ; water, 200. Different quantities of the reagent were added to the test tubes, mixed with the bacterial suspension, made up to 4 cc. and covered with a 2 cm.-high layer of paraffin. Each series was kept at 19°, 30°, 45° and 60° C. Reduction power is much more pronounced in the case of *Past. pseudotuberculosis rodentium* than of *Past. pestis*.

Only 3 strains of plague out of 60 decolorized the dye completely and that in 2 to 3 hours at 30° C., whereas decolorization was complete in all 11 strains of *Past. pseudotuberculosis rodentium* in under one hour.

W. F. Harvey.

BERLIN (A.). Zur Frage ueber die Bedeutung der Termo-Präzipitations-reaktion in der Praxis der Untersuchung der Pestepizootien. [**Specificity of the Thermoprecipitin Reaction in Plague.**]—*Rev. Microbiol., Epidémiol. et Parasit.* 1930. Vol. 9. No. 1. pp. 54–59. [11 refs.] [In Russian. German summary p. 129.] [Inst. of Microbiol. & Epidemiol., Saratov.]

The serum used was a curative plague serum. It was found that the reaction, carried out with extracts of organs, was positive in the case of 83·3 per cent. of naturally infected animals but also positive in 12·2 per cent. of non-plague animals. This is not sufficiently specific to be of practical use.

W. F. Harvey.

BERLIN (A.). Serodiagnose der Pest und Konglutinationsreaktion mit den Pestbacillen. [**Serum Conglutination Reaction with Plague Bacilli.**]—*Rev. Microbiol., Epidémiol. et Parasit.* 1930. Vol. 9. No. 1. pp. 10–53. With 1 chart in text. [75 refs.] [In Russian. German summary pp. 127–128.] [Inst. of Microbiol. & Epidemiol., Saratov.]

The reaction, if it is to attain precision and exclude fallacy, requires titration of the complement which is used in the test. It is more sensitive than the agglutination reaction but is no more able than other serum reactions to differentiate between *Past. pestis* and *Past. pseudotuberculosis rodentium.*

W. F. Harvey.

BULLETIN DE L'OFFICE INTERNATIONALE D'HYGIÈNE PUBLIQUE. 1930. May. Vol. 22. No. 5. pp. 940–977. Rapport du Dr. G. D. Chitre, résumant les observations faites dans les docks de la Société du Port de Bombay par le fonctionnaire chargé des recherches sur la prophylaxie de la peste, sous la direction du Directeur du Laboratoire de Bactériologie de Bombay à Parel, Bombay. [**Plague Prophylaxis in the Port of Bombay.**]

The compiler of this Report gives a detailed account of the methods employed for preventing and eradicating plague in the Bombay Docks. The paper will be useful to young men beginning sanitary work.

J. H. T. W.

BOUFFARD (G.). Au sujet de l'étiologie de la peste. [**Etiology of Plague.**]—*Bull. Soc. Path. Exot.* 1930. June 11. Vol. 23. No. 6. pp. 563–564.

As the result of experience in plague on the Madagascar plateau at Antananarivo the author states that man transports plague infection for long distances, creating a local interhuman epidemic during the course of which the rats may become infected, thus leading to an endemic condition of long duration.

J. H. T. W.

LEGER (Marcel). Rôle non exclusif des rats comme réservoirs du virus de la peste. [**The Rat not the Sole Reservoir of Plague.**]—*Bull. Soc. Path. Exot.* 1930. June 11. Vol. 23. No. 6. pp. 564–568. [7 refs.]

Without denying the important rôle of rats, etc., in the transmission of plague, the author considers the rôle of man, as convalescent carrier, chronic carrier and healthy carrier, cannot be disregarded [this *Bulletin*, Vol. 24, p. 34 (LEGER)]. The author quotes Inspector General LASNET, who has expressed a similar opinion with regard to plague in Madagascar.

J. H. T. W.

TIKHOMIROVA (M.) & NIKANOROV (S.). **Ticks as Plague Carriers.**—*Rev. Microbiol., Epidémiol. et Parasit.* 1930. Vol. 9. No. 1. pp. 60–61. [1 ref.] [In Russian. English summary pp. 129–130.] [Inst. of Microbiol. & Epidemiol., Saratov.]

Definite cultural and infectional evidence of the presence of plague bacilli in the alimentary tract of ticks, which were found on plague-infected susliks and tarbagans, has been obtained. This may prove to be of epidemiological importance.

W. F. Harvey.

GOLOV (D.) & KNIAZEVSKY (A.). Sur le rôle des ectoparasites (puces et tiques) du nid vide des spermophiles (*Citellus pymaeus*) dans l'épidémiologie de la peste. [**The Role of Fleas and Ticks of the Empty Nest of Spermophiles in the Epidemiology of Plague.**]—*Rev. Microbiol., Epidémiol. et Parasit.* 1930. Vol. 9. No. 1. pp. 62–67. [In Russian. French summary pp. 130–132.] [Inst. of Microbiol. & Epidemiol., Saratov.]

During an intense epizootic of plague in Kirghiz it was found that fleas and ticks from the empty nests of spermophiles could be plague-infected. Plague-infected fleas were also found in this epizootic upon healthy spermophiles.

W. F. Harvey.

RANDRIA (Stanislas). Localisation rare d'un bubon pesteux, bubon sus-épitrochléen. [**Rare Position of Plague Bubo.**]—*Bull. Soc. Path. Exot.* 1930. May 14. Vol. 23. No. 5. pp. 553–554.

Records a case of plague in which the only bubo was above the elbow in the epitrochlear gland.

J. H. T. W.

GAISKY (N.). Les problèmes d'épidémiologie [de la peste] et d'épizootologie en rapport aux particularités de la nature de la région des Kirghiz. [**Epidemiology of Plague in the Kirghiz Region.**]—*Rev. Microbiol., Epidémiol. et Parasit.* 1930. Vol. 9. No. 1. pp. 1–9. With 2 text figs. [Refs. in footnotes.] [In Russian. French summary pp. 125–126.] [Inst. of Microbiol. & Epidemiol., Saratov.]

This paper deals with the influence of local conditions and the bionomics of the marmot upon the epidemiology of plague (mention of which is omitted in the title of the French résumé). The treatment of the subject is rather speculative.

C. A. Hoare.

PHOTAKIS (B. A.). Pathologisch-anatomische Befunde bei einem Pestfall. [**Pathological Anatomy of a Case of Plague.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1930. Oct. Vol. 34. No. 10. pp. 562–564. [1 ref.]

The author describes at some length the morbid anatomy and morbid histology of a case of plague, but the paper contains nothing new, nothing that has not been recorded by other writers.

J. H. T. W.

HALLER (O.). Die experimentelle Pest der Katzen. [**Experimental Plague in Cats.**]—*Rev. Microbiol., Epidémiol. et Parasit.* 1930. Vol. 9. No. 2. pp. 139–154. [In Russian. German summary pp. 277–280.]

A laboratory paper of experiments on cats—of no particular interest. [It is well known that cats contract plague under natural conditions.]

J. H. T. W.

SABOLOTNOW (P.) & SCHMIDT (B.). Zur Morphologie der experimentellen Lungenpest. [**Morphology of Experimental Lung Plague.**]—*Rev. Microbiol., Epidémiol. et Parasit.* 1930. Vol. 9. No. 2. pp. 155–168. [9 refs.] [In Russian. German summary p. 280.] [State Inst. for Microbiol. & Epidemiol., Saratov.]

The author describes the morbid anatomy of experimental pneumonic plague as seen by him ; his work more or less agrees with previous findings [see this *Bulletin*, Vol. 22, p. 375 (KULESHA)]. J. H. T. W.

BEZSONOVA (A.) & LOKHOV (M.). **A Case of Pigment Production by Plague Bacilli.**—*Rev. Microbiol., Epidémiol. et Parasit.* 1930. Vol. 9. No. 1. pp. 109–112. With 1 text fig. [6 refs.] [In Russian. English summary p. 137.] [Inst. of Microbiol. & Epidemiol., Saratov.]

A slope-agar culture of plague, isolated from a suslik and kept at room temperature for 2 months, developed in the centre of several of the colonies a dark violet pigment. Subcultures from the pigmented portion produced typical colonies of *Past. pestis*. W. F. Harvey.

i. KENAOUI Bey (N.). Epidémiologie de la peste à Alexandrie. [**Plague in Alexandria.**]—*Rev. Prat. Malad. des Pays Chauds.* 1930. June. Vol. 10. No. 6. pp. 251–257.

ii. OMAR Bey (Abdel Rahman). Etude clinique de la peste.—*Ibid.* pp. 258, 261–264.

iii. COMPTON (Arthur). Rapport sur la peste (Bactériologie).—*Ibid.* pp. 265–268.

These papers deal with plague in the past and in the present time in Alexandria : i. Epidemiology ; ii. Clinical aspects of plague ; and iii. Bacteriology ; they contain nothing new. J. H. T. W.

ARISTARKHOVA (O.). Observations sur la peste endémique en Russie.—*Bull. Soc. Path. Exot.* 1930. Nov. 12. Vol. 23. No. 9. pp. 901–904. [3 refs.]

BOUFFARD (G.). Considérations au sujet de la transmission de la peste.—*Bull. Soc. Path. Exot.* 1930. May 14. Vol. 23. No. 5. pp. 455–456.

CONSEIL (E.) & DURAND (P.). La peste pulmonaire de Tunis en 1929–30.—*Tunisie Méd.* 1930. Apr. Vol. 24. No. 4. pp. 129–135.

LEGER (Marcel). Remarques sur l'interdépendance de la peste chez le rat et chez l'homme.—*Bull. Soc. Path. Exot.* 1930. May 14. Vol. 23. No. 5. pp. 448–451.

MANDOUL (H.). Les rats et la peste.—*Jl. Méd. de Bordeaux.* 1930. June 30. Vol. 107. No. 18. pp. 499–501.

SSYSSINE (A.). Petite épidémie de peste au Kazakstan oriental de l'U.R.S.S.—*Bull. Office Internat. d' Hyg. Publique.* 1930. Nov. Vol. 22. No. 11. pp. 2101–2102.

THIROUX. Recherches sur les causes de l'existence de la peste pulmonaire dans les régions froides ou tempérées et de son absence dans les zones à température élevée à Madagascar.—*Ann. de Méd. et de Pharm. Colon.* 1930. Jan.–Feb.–Mar. Vol. 28. No. 1. pp. 35–43.

TROPICAL DERMATOLOGY.

Fox (Howard). **Dermatology in Mexico.**—*Arch. Dermat. & Syph.* 1930. Oct. Vol. 22. No. 4. pp. 620–623. [1 ref.]

Although there are five other hospitals throughout the country, the scientific study of dermatology is chiefly confined to Mexico City. At the General Hospital there are 30 skin beds, where cases of pellagra and pseudopellagra in alcoholics were seen. As the modern treatment of ringworm by thallium acetate is the result of work done in Mexico in 1919, it is interesting to note that more than 1,500 cases have been treated there without any serious ill-effects. From his own local studies the author is of the opinion that pinta and carate are clinically identical. For the treatment of leprosy there are special dispensaries, but no hospitals or colonies. The official report of 1927 gives the number of lepers as 1,450, but it is probable that the actual figure is somewhere in the neighbourhood of 7,000. The republic also contains fifty dispensaries for the treatment of syphilis, but the only figures available in this connexion refer to injections, tests, etc.

M. Sydney Thomson.

Bonnin (Henri). Les dyschromies tropicales. [**Tropical Anomalies of Pigmentation.**]—*Rev. Prat. Malad. des Pays Chauds.* 1930. Aug. Year 9. Vol. 10. No. 8. pp. 367–370, 373–380, 383–385. [2 refs.]

A very complete discussion of all dyschromias, starting with congenital changes such as albinism, passing through general diseases (pellagra, etc.), physiological and toxic changes, to a full description of scarring effects and mycotic infections. The article contains many synonyms for each disease, including the native terms from many parts of the world. Carate and Tinea versicolor flava are dealt with very fully. "Among coloured races dyschromias are more often due to variations in the thickness, etc., of the horny layer (caused by fungi) than to variations in the distribution of the cutaneous pigment itself."

M. S. T.

Kurotchkin (T. J.) & Chen (F. K.). **A Study on the Etiology of Hongkong Foot.**—*Nat. Med. Jl. China.* 1930. Oct. Vol. 16. No. 5. pp. 556–562. [7 refs.] [Peiping Union Med. College, Peiping.]

Mycological investigations designed to determine precise details of the causative fungi and the possible existence of "carriers." Of 150 apparently normal individuals only 5 revealed fungus between the toes, but 107 grew Penicillium and Aspergillus. Twenty-five per cent. of doubtful clinical cases gave positive results. Nearly all the typical cases were confirmed microscopically. Cultures proved *Trichophyton pedis* α and β to be dominant, these two fungi differing from each other, however, only in the colours of their colonies.

M. S. T.

WEISS (Pedro). Sur un trichophyton isolé de trois cas de dyshydrose des extrémités. [**A Trichophyton isolated from Three Cases of Dyshidrosis.**]—*Rev. Sud-Américaine de Méd. et de Chirurg.* Paris. 1930. Mar. Vol. 1. No. 3. pp. 277–282. With 4 text figs. [Research Lab., Faculty of Med., Lima.]

It is stated that 50 per cent. of the middle-class adults in Lima suffer from dyshidrosis of the hands and feet during the spring. Microscopical investigations revealed the presence of fungi in the great majority of cases, but only 3 pure cultures were obtained. These were all identical and are classified as belonging to the Aleuroclosters, full details and diagrams being given. The one clinical picture (of the sole) would seem to be typical of ringworm and in no way resembles dyshidrosis as understood in Britain.

M. S. T.

CARRION (Arturo L.). **Observations on Dermatomycosis in Porto Rico. Report on Epidermophytosis of the General Surface of the Skin.**—*Porto Rico Jl. of Public Health & Trop. Med.* 1930. Dec. Vol. 6. No. 2. pp. 217–220. With 12 plates. [School of Trop. Med., Univ., Porto Rico.]

The disease is extremely common in Porto Rico, and is by no means restricted to the inguino-crural region. Often the area of a single sheet of infection may involve a square foot or more. Lesions of the face and neck often extend for several inches into the scalp, yet the hairs in such lesions have never been found to be invaded. The differential diagnosis is discussed in detail. The illustrations are good.

M. S. T.

IN (Keiden). **A Study of Dermatophytes along the Shores of the Lower Course of the Yang-Tse-Kiang (II).**—*Japan. Jl. Dermat. & Urol.* 1930. July. Vol. 30. No. 7. pp. 81–83. [Section on Dermat. & Syph., Imperial Univ., Tokyo.]

Discusses a disease known locally as La-Li-Dau. It is probable that this is always secondary to favus (*A. Schoenleinii*) of the scalp and is itself really favus of the glabrous skin. In some cases chronic abscesses appear, difficult to differentiate from kerion and from which the fungus has been cultivated. It is suggested that the name Favus profunda be applied to such cases.

M. S. T.

TAYLOR (K. P. A.). **Treatment of Ringworm Infection of the Feet with the Ethyl Chloride Spray.**—*Southern Med. Jl.* 1930. Dec. Vol. 23. No. 12. pp. 1128–1130. [7 refs.]

A detailed report of twenty cases in which no other treatment was used except where severe pyogenic infection necessitated wet dressings with a 4 per cent. boric acid lotion. Only eight temporary relapses occurred, but the longest period of observation after apparent cure was only two months. The affected patch is exposed to the ethyl chloride spray until blanched, the spray then being continued for a further 30 to 60 seconds. The blanching should extend about 0·5 cm

beyond the obvious lesion. This is repeated in daily doses of 30 seconds (twice a day for the sole). At the most 6 exposures only are necessary, but the method is contra-indicated where eczematization is present. Itching is usually relieved at once and extensive desquamation always occurs.

M. S. T.

URUEÑA (J. Gonzalez). **Ringworm of the Soles in Mexico. Clinical Study.**—*Arch. Dermat. & Syph.* 1930. June. Vol. 21. No. 6. pp. 909–915. With 4 text figs.

"The vesiculated type of ringworm, resembling dyshidrosis, is rare," most cases showing maceration, scaling, fissuring, secondary infection and eczematization only in the typical areas of distribution. The paper concludes with a study of *Trichophyton asteroides*. It is not stated, however, how frequently this organism is found.

M. S. T.

SMITH (E. C.). **Two Cases of Dermatitis due to a Species of** *Hormodendrum.*—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1931. Jan. 31. Vol. 24. No. 4. pp. 461–464. With 3 plates. [Med. Research Inst., Lagos, Nigeria.]

A description of two atypical "ringworm" cases, the only two such cases seen in Lagos during several years. The first patient showed numerous dry, slightly raised, irregular and scaly patches. On scraping, the epithelium broke away to leave a raw base. In the second case a definite advancing edge was present, but it too was psoriasiform and friable. Nails were apparently uninfected although there was thickening of the nail-bed. The fungus was easily found both in scrapings and sections, whilst cultures gave green colonies of *Hormodendron*, the exact species being at present undetermined.

M. S. T.

FRAGA (Arminio). [In Portuguese & English.] Sobre um caso de dermatite ulcero-nodular causada pelo *Hormodendrum Langeroni*. **On a Case of Ulcero-Nodular Dermatosis produced by** *Hormodendrum Langeroni.*—*Rev. Med.-Cirurg. do Brasil.* 1930. Sept. Vol. 38. No. 9. In Portuguese pp. 321–329. With 12 text figs. & 2 figs. on 1 plate. In English pp. 330–336.

A detailed account of a case occurring in a negress aged 39. The lesions appeared on the right leg, which was also affected by longstanding varix. There was present a single ulcer measuring 3 cm. in its longest diameter and having a sharply cut and partially undermined edge. The base was irregular, dark red and covered with a malodorous and purulent exudate. There were also present three subcutaneous nodules arranged in a straight line, with intervals, at some distance proximal to the ulcer. The inguinal glands of the same side were also enlarged. Material was taken from an unbroken nodule and from it the characteristic cultures were obtained. Rapid healing occurred after intravenous injections of sodium iodide. The article also discusses cases previously described and details the microscopical and cultural features of the organism.

M. S. T.

KUROTCHKIN (T. J.) & CHUNG (H. L.). **Mycological Examination of Peiping Orphanages.**—*Nat. Med. Jl. China.* 1930. Apr.–June. Vol. 16. No. 2/3. pp. 171–176. With 5 figs. on 2 plates (1 coloured). [1 ref.] [Peiping Union Med. College, Peking.]

Examination of 5 orphanages, containing a total of 1,155 children, showed that ringworm was present in all the institutions, and was very prevalent in four of them, the infection in one affecting 90 per cent. of the children. The most common fungus was *Trichophyton violaceum*, two varieties of which were isolated. The fungus second in order of frequency is provisionally named *Trichophyton "A."* *Trichophyton glabrum*, *Microsporum ferrugineum* (two varieties) and *Achorion schönleinii* were also met with.

P. Tate.

DA FONSECA (Olympio), Jr. & LEVY (A. Simão). [In Portuguese & English]. Uma epidemia de tonsurante infantil no Rio de Janeiro. **Epidemic Outbreak of Scalp Ringworm in Rio de Janeiro.** —*Rev. Med.-Cirurg. do Brasil.* 1930. Apr. Vol. 38. No. 4. In Portuguese pp. 136–139. With 4 figs. In English pp. 140–141. [Oswaldo Cruz Inst. & Med. School, Rio de Janeiro.]

Scalp ringworm is uncommon in Brazil, but an epidemic broke out in a children's boarding school near Rio de Janeiro in 1929. Of 150 children about one-third were infected, 3 being girls and the remainder boys. Cultures showed that *Trichophyton violaceum* was the fungus infecting the boys, and *Trichophyton acuminatum* that infecting the girls.

P. Tate.

CATANEI (A.). Etude des teignes dans la Grande Kabylie. [**Ringworm in the Grand Kabylie.**]—*Bull. Soc. Path. Exot.* 1930. Feb. 12. Vol. 23. No. 2. pp. 170–173. [1 ref.] [Pasteur Inst. of Algeria, Algiers.]

An examination carried out along lines similar to those adopted by the author in his recent investigations of ringworm in neighbouring parts of North Africa. Of 663 children examined, 89 were infected with trichophyta and 32 with favus, there being no cases in which Microspora were found. The majority of patients were between 6 and 13 years of age, boys being more numerous than girls. Cultures proved the presence of three varieties of fungus only. *Tr. glabrum*, *Tr. violaceum* and *A. schoenleinii.*

M. S. T.

CATANEI (A.). Etude des teignes dans des agglomérations européennes d'Algérie. [**Ringworm among the European Population of Algeria.**] —*Bull. Soc. Path. Exot.* 1930. Apr. 9. Vol. 23. No. 4. pp. 363–368. [1 ref.] [Pasteur Inst. of Algeria, Algiers.]

Investigations carried out in Oran and Algiers among inhabitants of Spanish and Italian extraction. Among 285 children examined, 19 out of a total of 22 infected were found in a fishing village west of Algiers, the population being preponderantly Italian. Of the 22 cases, the

majority occurred between the ages of 6 and 10 years, and were girls, an unexpected discovery. Two of the patients only suffered from favus, *A. schoenleinii* being responsible. The remaining 20 gave cultures of *Tr. glabrum* and *Tr. violaceum*. *Tr. sulfureum* was also isolated once. No cases of Microsporon infection were discovered.

M. S. T.

McGusty (V. W. T.). **Tinea Imbricata in Fiji—with Suggestions for its Treatment and Prevention.**—*Fiji Ann. Med. & San. Rep. for Year 1929.* pp. 67–71.

The disease is widespread in Fiji, particularly among the inland natives. It is pointed out that the mucous membranes may be involved, but the hairs are always unaffected and are only lost where lichenification has supervened in very chronic cases. The whole body, including nostrils, external auditory meatus, etc., is painted every five days in limited areas with a 40 per cent. solution of salicylic acid in tinct. iod. fort. Three applications usually produce a cure, but the method must be modified in children and in certain areas such as the eyelids. The paper discusses the questions of segregation and disinfection of huts, etc., very thoroughly.

M. S. T.

da Fonseca (O.). **Parasitological and Clinical Relationship between Asiatic and Oceanian Tokelau and Brazilian Chimbêrê of some Matto-Grosso Indians.**—*Rev. Med.-Cirurg. do Brasil.* 1930. Aug. Vol. 38. No. 8. pp. 292–307. With 6 figs. on 4 plates. [6 pages of refs.]

In the cases described the characteristic features are large, circinate and confluent patches of scaling on the exposed parts of the body. They are always unpigmented and the scaling is more intense at the centre. No lesions of the hair or nails were observed. Microscopy of the scales shows small reddish brown granules in the cells of the mycelium, whilst the cultural characteristics of the fungus classify it as an Endodermophyton. It is stated that concentric rings were never seen but that on all other grounds these cases seem closely related to those of Tokelau ringworm. The article also contains a very full account of the topography, etc., of this and such closely related diseases as Tokelau and Pinta.

M. S. T.

Ramos y Silva (J.). Sobre um novo caso de "Tinea nigra." [**A Fresh Case of Tinea nigra.**]—*Brasil-Medico.* 1930. July 12. Vol. 44. No. 28. pp. 755–757. With 3 text figs. [4 refs.]

Infection by *Cladosporium wernecki*, so named by Horta and Langeron as differing from *Cl. mansoni*, is rare in Brazil. The first case was recorded by Horta in 1921; a second by Silva in 1929, while Rietmann in 1930 stated that he had been able to collect notes of eight in Salvador (Bahia). All were in males and, according to Rietmann, all in the palm of the hand. The patient referred to in this paper was a laboratory assistant who, a few days after contact with a

typical case, developed a lesion on the neck. The fungus was isolated and cultivated on maltose sugar. Growth is slow; the colony was 15–20 mm. in diameter and 5 mm. high at the end of a month.

H. H. S.

DA FONSECA (Olympio), Jr. & DA ROSA (A. Ferreira). [In Portuguese & English.] Sobre a "keratomycosis nigricans palmaris." **On a Case of "Keratomycosis nigricans palmaris."**—*Rev. Med.-Cirurg. do Brasil.* 1930. Sept. Vol. 38. No. 9. In Portuguese pp. 337–340. With 2 figs. on 1 plate. In English pp. 341–344.

After a full discussion of the history of the disease, a case in a young child is described. There first appear small brownish macules, which slowly form groups and polycyclical patches. There is no erythema and practically no scaling, although the edges may be slightly raised. The palms are far more commonly affected than are other areas. The lesions vary from light brown to black in different cases, but are almost uniform in the individual patient. There is a good illustration and the article closes with an account of the characteristic features of *Cladosporium wernecki*.

M. S. T.

SILVA (Flaviano). A proposito da "tinea nigra" (keratomycosis nigricans palmaris). [**"Tinea nigra."**]—*Brasil-Medico.* 1930. Oct. 25. Vol. 44. No. 43. pp. 1201–1204. With 3 text figs.

A medical student, aged 22, noticed some black spots at the root of the thumb and first two fingers of the left hand, palmar surface. Washing would not remove them, so he pricked them off with a pin, but 5 days later they reappeared. He again removed them, and then applied alcohol and tincture of iodine. They again recurred. The individual spots varied from mere pinpoints to 3 mm. in size. They caused no itching or discomfort except from their colour and situation. Seen by the author, the real condition was at once diagnosed and the *Cladosporon mansoni* (1905) isolated on Sabouraud's medium. The name *Cl. wernecki* was given by HORTA in 1921 to the same fungus.

H. H. S.

AARS (Charles G.). **Piedra.**—*Arch. Dermat. & Syph.* 1930. Sept. Vol. 22. No. 3. pp. 401–409. With 9 figs. [10 refs.]

An article based on 60 cases seen in Dutch Guiana. The fungus attacks the hair only and can be seen by the naked eye as small nodules on the shaft, somewhat resembling "nits." It causes no symptoms, and as the root is never affected, treatment with antiseptics, shaving, etc., is simple. The disease is not easily spread and experiments with river water were completely negative, which would seem to disprove the local belief that infection occurs as a result of such bathing. The fungus is not a true ectothrix as it does cause slight erosion of the cuticle. The nodules show perithecia with asci containing light fusiform spores. Cultures were all of the type Rabello-Mosta. The cases very closely resembled those seen in Brazil and Paraguay, where, however, the disease is less common.

M. S. T.

THONNARD-NEUMANN (Ernst), CAMACHO-MOYA (Jorge) & BREWSTER (K. C.). Klinische Beobachtungen bei Pinta (Carate) in Kolumbien. Ein vorläufiger Bericht. [**Clinical Observations on Pinta (Carate) as seen in Colombia.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1931. Jan. Vol. 35. No. 1. pp. 48–53. [United Fruit Co. Hosp., Santa Marta.]

Seventy-five cases were examined, and in 90 per cent. of them the Wassermann and Kahn reactions were positive, as compared with 40 per cent. in uninfected control cases. Only 15 per cent., however, gave a history of a primary chancre, 40 per cent. again being the figure obtained in controls. Radiography proved that 80 per cent. of the pinta patients suffered from aortic dilatation, whilst twenty out of thirty-four cases under the age of thirty showed definite signs of cardiac and vascular disease. The same percentage (eighty) had definite enlargement of the lymphatic glands, particularly the epitrochlear, and also had a symmetrical eruption. It is admitted that the work is far from complete, but the above findings lead to the hypothesis that pinta is not simply a dermatomycosis but is a systemic disease with marked epidermal changes.

M. S. T.

JONES (Jack W.) & ALDEN (Herbert S.). **Actinomycosis (Mycetoma): Report of Six Cases in Georgia.**—*Southern Med. Jl.* 1930. Oct. Vol. 23. No. 10. pp. 906–914. With 10 text figs. [21 refs.] [Med. School, Emory Univ., Atlanta, Ga.]

The author reviews the histories of actinomycosis and mycetoma very fully and points out that although they are caused by various fungi, these give rise to the same variety of tissue response. For this reason the terms may be considered synonymous, at least from a clinical point of view. The six cases are described in great detail, the head or neck being affected in all. The organism is often extremely difficult to find in the pus and even more difficult to cultivate. Granules are only found in long-standing cases, and for this reason many early lesions escape diagnosis. In suspected lesions the sinuses may be washed out with saline and their walls then curetted gently. The material thus obtained will give a large number of positive results when mounted in potash. The subsequent discussion revealed the opinion that the best treatment is the intravenous injection of Lugol's solution with or without an equal part of 20 per cent. sodium thiosulphate.

M. S. T.

GAY (Douglas M.) & BIGELOW (James B.). **Madura Foot due to *Monosporium apiospermum* in a Native American.**—*Amer. Jl. Path.* 1930. May. Vol. 6. No. 3. pp. 325–335. With 1 text fig. & 5 figs. on 2 plates. [11 refs.]

Seven other cases of infection with this fungus were found in the literature and are all reviewed fully in this article. Whilst these occurred in natives of Italy, Brazil and Algiers, the present case concerns a native white American male who has never been outside of the United States. The lesions, clinically typical of Madura foot, had lasted for ten years. They were unaffected by iodides, etc., and ultimately amputation was performed. The microscopical and biological characteristics of the organism are described in detail. The illustrations are good.

M. S. T.

VASUDEVAN (A.) & SESHADRINATHAN (N.). **A Few Atypical Cases of Mycetoma.**—*Indian Jl. Med. Res.* 1930. Oct. Vol. 18. No. 2. pp. 477–481. With 4 plates (1 coloured). [Med. College, Madras.]

A clinical and histological description of seven unusual specimens examined after amputation. In addition to five cases from the foot there were one from the knee joint and one mass from the gluteal region. In some there were encapsuled and spherical tumours which probably resulted from a successful localization by fibrous tissue response. Two cases were apparently caused by *N. bovis*, which is rare in S. India. The paper is well and amply illustrated.

M. S. T.

ARTOM (Mario). Micetoma actinomicosico del piede (piede di Madura). [**Actinomycotic Infection of the Foot.**]—*Giorn. Ital. Dermat. e Sifil.* 1930. Oct. Vol. 71. Year 65. No. 5. pp. 1516–1532. With 13 figs. (1 coloured) on 2 folding plates. [58 refs.]

A case of actinomycotic infection of the foot, contracted near Novara. The fungus was proved to be *Actinomyces bovis*. Treatment by K.I. and curettage.

H. H. S.

CAFFREY (P. J.). **Mycetoma in the Bornu Province of Northern Nigeria.**—*West African Med. Jl.* 1929. July. Vol. 3. No. 1. pp. 22–23. With 4 figs. on 1 plate. [3 refs.]

A detailed account of five cases encountered within three months. All the patients were well-nourished and exhibited no systemic disturbance, complaining only of neuralgic pains in the affected areas. One case was unusual in that the foot remained free from involvement although the leg above the ankle was extensively affected. In only one case was improvement noted, that patient being treated with daily intravenous injections of Lujol's iodine, starting with five minims and increasing by two minims daily to a maximum of thirty-four minims.

M. S. T.

KYRIASIDES (K. N.). Die in Griechenland bei Madurafuss (Mycetoma pedis) gefundenen Pilzarten. [**Fungi found in Madura Foot in Greece.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Dec. Vol. 33. No. 12. pp. 656–660. With 2 text figs. [15 refs.]

KYRIAZIDÈS (K.). Champignons des mycetomes observés en Grèce. [**Fungi of Mycetomas observed in Greece.**]—*Ann. Parasit. Humaine et Comparée.* 1930. Mar. 1. Vol. 8. No. 2. pp. 194–200. With 2 text figs. [6 refs.] [Evanghelismos Hosp., Athens.]

Of the 8 cases of mycetoma which have been observed in Greece 5 have been shown by cultures to be due to *Streptothrix* [*Actinomyces*] *madurae* (Vincent). Of the remaining 3 cases, 2 have been diagnosed microscopically, and 1 by cultures, to be due to *Indiella reynieri* Brumpt.

P. Tate.

AARS (Charles G.). **Madura Foot: its Histology and Mycology.**—*Arch. Dermat. & Syph.* 1930. Apr. Vol. 21. No. 4. pp. 570–574. With 3 text figs. [6 refs.]

The first recorded case of mycetoma pedis in Dutch Guiana is briefly described. It occurred in a woman aged 41, and was apparently due to *Actinomyces madurae*. Treatment with large doses of potassium iodide was ineffective.

P. Tate.

JONES (Jack W.) & ALDEN (Herbert S.). **Maduromycotic Mycetoma (Madura Foot): Report of a Case occurring in an American Negro.**—*Jl. Amer. Med. Assoc.* 1931. Jan. 24. Vol. 96. No. 4. pp. 256–260. With 8 text figs. [11 refs.] [Med. School, Emory Univ., Atlanta, Ga.]

A typical case of fifteen years' duration seen in a negro aged fifty-five. For twenty-five years he had lived in Atlanta, Georgia, where he came under observation. White granules were found, whilst the cultural and morphologic characteristics of the fungus are described in detail and classify it as *Scedosporium apiospermum*. The illustrations are excellent.

M. S. T.

BLANC (Georges), JOANNIDÈS (G.) & PAPAÏOANNOU (A.). Sur un cas de pied de Madura à grains blancs causé par *Actinomyces Madurae*. [**A Case of Madura Foot showing "White Bodies" and caused by** *Actinomyces Madurae*.]—*Arch. Inst. Pasteur Hellénique.* 1930. Vol. 2. No. 2. pp. 335–338. With 4 figs. on 3 plates. [4 refs.]

A woman aged 70, seen in May 1930 in Athens, the disease then having been present in the left foot for about two years. The case being typical, the greater part of the article is devoted to a description of the organism and its cultures. The illustrations are poor.

M. S. T.

DA FONSECA (Olympio), Jr. & LEÃO (A. E. de Arêa). [In Portuguese & English.] As Chromoblastomycoses. **Chromoblastomycosis.**—*Rev. Med.-Cirurg. do Brasil.* 1930. June. Vol. 38. No. 6. In Portuguese pp. 197–216. In English pp. 216–236. With 8 figs. on 3 plates. [2 pages of refs.]

A detailed account of all the investigations which have hitherto been carried out into the causes of tropical verrucous dermatites, with special reference to *Phialophora verrucosa* and allied organisms. A detailed account is given of the case of chromoblastomycosis observed by MEDLAR & LANE in the United States. Apart from this one example, all other cases of this disease have been observed in Brazil and have been caused by *Acrotheca pedrosoi*. Seventeen cases are reported in detail. Clinically all show nodules, ulcers and warty growths on the feet. The histology, cultural characteristics and morphology are all fully described. The cases are all blastomycoses, the prefix "chromo-" being added as the cultures of the causative organism are a dark greenish grey in colour, sometimes with a tinge of violet.

M. S. T.

BONNE (C.). Sur la présence de la chromoblastomycose aux Indes orientales néerlandaises. [**Chromoblastomycosis in the Dutch East Indies.**]—*Bull. Soc. Path. Exot.* 1930. Oct. 8. Vol. 23. No. 8. pp. 765–766. [9 refs.] [Path. Inst., Batavia, Java.]

A full clinical description of the first typical case seen in Sumatra. Cultures have so far been unsuccessful. Reference is also made to a second case, but the chief value of the note lies in the complete bibliography.

M. S. T.

SILVA (Flaviano) & DE ARAUJO (Eduardo). Caso de chromoblastomycose. [**A Case of Chromoblastomycosis.**]—*Brasil-Medico.* 1930. May 17. Vol. 44. No. 20. pp. 539–541. With 5 text figs. English summary p. 541.

The patient was a man of 52 years. In 1913 an ulcer formed on the right great toe which healed after cauterization. Four years later, nodules appeared on the dorsum of the foot and this and the lower half of the leg became involved in a verrucose growth, with foci of infiltration and cicatrization. Cultural attempts in Sabouraud's medium were unsuccessful but sections of the tissue showed giant cells, leucocytic infiltration, small collections of pus, and rounded vesicular bodies of a dark brown colour which have been described by others in similar cases and denominated *Acrotheca pedrosoi.*

H. H. S.

PAZIENZA (Mario). Su di un raro caso di saccaromicosi cutanea a localizzazioni multiple. [**A Rare Case of Multiple Cutaneous Mycosis.**]—*Riforma Med.* 1930. Feb. 17. Vol. 46. No. 7. pp. 244–246, 249–250. With 8 text figs. [8 refs.] [Surg. Clinic & Hosp. for Incurables, Naples.]

The patient was a man of 31 years presenting an ulcer of a granulomatous character the size of the palm, occupying the middle third of the right calf. It had first appeared as a minute itchy swelling a year previously. There was a smaller sore on the left internal malleolus. No treatment was of any avail and the right leg was amputated. Later a large ulcer spread over the left leg, which in turn was amputated, but subsequently an enormous ulcer covered the stump of the latter to the groin; others appeared on the arms and the left side of the face, and death occurred some seven months later after he had left hospital. Certain bodies were seen in the tissue of the amputated limbs and culture enabled them to be identified as *Cryptococcus hominis.*

The pathogenicity of the organism, however, does not appear to have been firmly established.

H. H. S.

FISCHER (W. O.). **Treatment of Tropical Ulcer.**—*Jl. Med. Assoc. South Africa.* 1930. Nov. 8. Vol. 4. No. 21. pp. 647–648.

An account of work in Northern Rhodesia, in which the author states his definite belief that *Spirochaeta vincenti* is the causative organism. Excellent results were obtained by the intramuscular injection of 2 cc. of "novasurol" on alternate days. This is a water-soluble mercurial preparation which is made up in 2 cc. ampoules of a 10 per cent. solution by Bayer. 33 cases were studied and in all except 5 no spirochaetes were found after the third injection, their disappearance always being coincident with the loss of the foetid odour. Local antiseptics and daily spraying with 2 cc. of novasurol proved an important part of the treatment.

M. S. T.

TARAMELLI. Sur le traitement de l' "ulcus tropicum." [**The Treatment of Tropical Ulcer.**]—*Ann. Soc. Belge de Méd. Trop.* 1930. June 30. Vol. 10. No. 2. pp. 223–230.

An account of work carried out among the native troops in Italian Somaliland. Intravenous injections of Neojacol (914) are given every 5–6 days on about three occasions. The ulcer is washed thoroughly with benzine [benzol: the coal-tar derivative] and an occlusive caoutchouc dressing (Leukoplast Erba) is applied. This is carried out daily until the discharge has disappeared; it is then repeated every 4–5 days until healing is complete. It is stated that the resulting scars are always sound, supple and non-adherent.

M. S. T.

BOUFFARD (G.). L'ulcère phagédénique et son traitement. [**Tropical Ulcer and Its Treatment.**]—*Bull. Soc. Path. Exot.* 1930. May 14. Vol. 23. No. 5. pp. 483–491.

A paper evidently based on extensive personal experience in the French Sudan, Dahomey, Ivory Coast and Madagascar. It is definitely stated that the cause is to be found in Vincent's organism. This attacks tissues of lowered vitality and it is "for this reason that disastrous effects often follow caustic treatments and surgical intervention when thorough eradication of the organism has not been first attained." A breach of surface is not essential for infection, for occasionally a pustule appears on unbroken skin and from it a pure growth of the organism may be obtained. Although the disease commonly attacks debilitated individuals, otherwise healthy victims are not rare. Virulence is increased by passage through many patients, and it is in these circumstances that tropical ulcer may become epidemic, e.g., in barracks.

In discussing prophylaxis, stress is laid on the need of well-fitting boots and on frequent bathing with a 10 per cent. aqueous solution of methylene blue. All traumatic wounds may be dressed with this or with stovarsol powder. All definite cases should be isolated in hospital.

"Tropical ulcer does ultimately proceed to spontaneous cure, but the resulting scars are then usually extensive, adherent and disabling." Only two fatal cases have been seen by the author and in them the septicaemia was complicated by the presence of streptococci. Great stress is laid on the fact that the disease does not confer immunity.

The question of treatment is discussed in great detail and contains many references. The author deplores all caustic and surgical methods, nor has he ever seen any good result from intravenous arsenical therapy. In particular he praises frequent local dressings with 3 per cent. N.A.B. in glycerine, the wound being washed thoroughly with boiled water before each application. After 4 or 5 days the ulcer is usually clean and may be healed under 10 per cent. picric acid lotion or a menthol ointment. Other methods recommended are the polyvalent lipovaccine of Lemoignic, 1 per cent. oil of chenopodium in oil of almonds and a powder consisting of 4 per cent. iodoform, 10 per cent. bismuth subnitrate and 86 per cent. Vincent's powder.

M. S. T.

DE PAOLI (Paolo). La cura specifica dell'ulcera tropicale fagedenica. [**Specific Treatment of Tropical Phagedaena.**]—*Arch. Ital. Sci. Med. Colon.* 1930. June 1. Vol. 11. No. 6. pp. 332–337. [9 refs.] English summary (6 lines) p. 337.

The author working in Somaliland and Eritrea used arsenic (neo-salvarsan mostly) and bismuth preparations. Of the latter he preferred Bismoxyl Bernocco (an oily suspension of the metal) and a colloid Bismuthoidol, by injection, and locally trepol in powder. He found the bismuth quite as efficacious as the arsenic, and prefers it because of its cheapness and the less risk of its giving rise to toxic symptoms.

H. H. S.

NORMET (Léon), HASLE (G.) & NGUYÊN-DUY-HA. Traitement des ulcères phagédéniques à fusospirilles par la vaccination locale spécifique. [**The Treatment of Tropical Ulcers by the Local Application of a Vaccine.**]—*Bull. Soc. Méd.-Chirurg. Indochine.* 1930. July. Vol. 8. No. 7. pp. 734–737. With 3 text figs.

An account of two cases in which the spirilla and fusiform organisms were found. A lipo-vaccine (the French antiphagedaenic) was rubbed in thoroughly and then applied as a wet dressing twice a day. Organisms disappeared within a week and healing was complete in 3–4 weeks.

M. S. T.

GARRY (Gerschon). Ulcus epidemicum. [**Ulcus epidemicum.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1930. July. Vol. 34. No. 7. pp. 351–354. With 1 text fig.

This paper is based on 100 cases seen during an epidemic in Palestine which lasted from August to December 1920. The patients were mostly children of the poorer classes, females predominating. The ulcers were mostly solitary and affected the lower third of the leg. Smears from them showed Gram-positive bacilli resembling Vincent's organism, but no spirilla were seen. Attempts at cultivation were unsuccessful. After 24 hours the original papule becomes a pustule, surrounded by erythema. Two to three days later this has formed a scab covering an ulcer of 4 cm. diameter, the edges of which are punched out but not undermined. A surrounding zone of oedema and brownish-red discoloration is then present, but lymphangitis does not occur. Although the ulcers are very painful and there is some rise in temperature, their course is mild, spontaneous healing usually taking place within three months. It is for these reasons that the author differentiates the lesions from those of Ulcus tropicum, of which, however, it may be a benign form. Novarsenobillon locally and intravenously proved valueless. Healing seemed to be expedited by wet dressings of sour milk, followed by saline.

[The author does not say whether he examined for the diphtheria bacillus. See this *Bulletin*, Vol. 16, p. 153.]

M. S. T.

WALKINGSHAW (R.). **The Healing of Ulcers.**—*Malayan Med. Jl.* 1930. June. Vol. 5. No. 2. p. 65.

The paper deals with the treatment of tropical ulcers as carried out in the hospital wards of Singapore. Mechanical cleansing with saline swabs is followed by hot saline baths twice a day; after each of these

the ulcer is treated with hydrogen peroxide. Between whiles saline foments are applied 4-hourly. Also " substitute a cold compress of 1/60 carbolic lotion for one of the middle-day foments." When thoroughly clean, 1 in 2,000 Acriflavine solution is applied to the floor of the ulcer and a " plain 4-hourly foment is placed on top." When the granulations are level with the skin surface, a dressing of normal horse serum is applied and left undisturbed for 4–6 days. This is then removed by soaking in saline and the dressing repeated until healing ensues.

M. S. T.

BERLIN (Chaim). Feigenbaumdermatitis. [**Dermatitis due to the Figtree.**]—*Dermat. Woch.* 1930. May 31. Vol. 90. No. 22. pp. 733–736. [5 refs.]

A typical dermatitis venenata, seen in Palestine towards the end of summer. The victims are mostly boys between the ages of six and twelve years. Though all exposed surfaces may be affected, the hands are the most common site, whilst occasionally the vesicles, etc., may be seen round the mouth. As the children climb the trees barefooted, the lesions are often seen on the feet. The sticky and milky sap of *Ficus Carica* seems to be definitely responsible in sensitive individuals. It is claimed that these are the first cases of figtree dermatitis to be reported.

M. S. T.

DI LULLO (Orestes). El paaj. Una nueva dermatitis venenata. [**Paaj. A New Form of Dermatitis Venenata.**]—Universidad de Buenos Aires, Misión de Estudios de Patología Regional Argentina. Monografia No. 2. 1930. 80 pp. [18 refs.]

This monograph is divided into two parts, the first mainly clinical, the second experimental. The former is practically a reprint of an article published in 1927 and already summarized (see this *Bulletin*, Vol. 25, p. 699). Paaj or " quebracho disease " is the name given to an irritative skin condition set up by contact with the leaves, flowers, fruit and probably the wood itself of *Schinopsis lorenzii*, one of the Anacardiaceae. The statement has been made that the pollen can also give rise to it, but the author, after his experiments, denies this. These experiments have been carried out with alcoholic extracts of various strengths, with distillates, ethereal extracts, etc., of fresh leaves. Nearly 200 tests have been made altogether, and he finds that all persons are not equally susceptible, though contact, even repeated, does not lead to immunity. By using " tinctures " (extracts in 95 per cent. alcohol) of varying strengths from 0·001 to 10 per cent. a grading of susceptibility can be determined. *Schinopsis lorenzii* is not among those mentioned in the text-books as setting up dermatitis venenata.

H. H. S.

HUME (Edgar Erskine). **Wet Sand Creeping Eruption at the Largest American Army Station.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. Nov. 25. Vol. 24. No. 3. pp. 313–326. With 5 figs. on 2 plates. [4 pages of refs.]

Contains a lucid history of all investigations, etc., since the disease was first described in 1874. The larvae seen in these Georgia cases

were all *Ancylostoma braziliense*, the temperature, humidity and sandy soil proving very favourable to their development. Whilst dogs and cats have been proved to act as hosts, pigs have not yet been incriminated. The disease was more common in children and persons of fair complexion. It starts as an urticarial papule which lasts for 3 or 4 days, after which there appears the characteristic linear, tortuous and serpiginous eruption, accompanied by intense itching, which day by day extends at one end, fading at the other. The rate of migration varies, averaging one-half to one inch in the twenty-four hours. The burrow usually becomes filled with serous exudate and is then secondarily infected. In untreated cases, the individual lesions are self-limited, the worm dying in the skin within a few weeks. The local treatment is applied where the itching is most intense, i.e., usually slightly in advance of the visible lesion. This area is frozen by the ethyl chloride spray for two minutes. It is then covered with wet dressings of boric acid and aluminium acetate. Over this is placed an ice-pack, the process being continued until itching vanishes and no activity is seen. The resulting desquamation then requires a paraffin ointment containing 2 per cent. of salicylic acid and 10 per cent. of boric acid. The illustrations are good, and the bibliography very full.

M. S. T.

Le Sueur (Elizabeth) & Hutchison (William). **A Note on the Treatment of Creeping Eruption with External Application of Oil of Chenopodium.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. Nov. 25. Vol. 24. No. 3. pp. 327–329.

An account of two cases seen in Sarawak, both being Europeans and in both *Ancylostoma caninum* being responsible. Infection was acquired in a swampy part of the golf course which is frequented by pariah dogs heavily infected with this parasite. Many treatments proved unavailing, cure at length being obtained by rubbing oil of chenopodium into the track for ten minutes. Subsequently 1 part of this oil was mixed with 3 parts of castor oil, the mixture being applied in the same way. Whilst the one application to one area was sufficient, it took 10 to 14 days to work over both feet in each case.

M. S. T.

Fuse (Shiro). Dermatitis linearis. [**Dermatitis linearis.**]—*Japan. Jl. Dermat. & Urol.* 1930. May. Vol. 30. No. 6. pp. 537–553. With 9 text figs. [8 refs.] [In Japanese. German summary p. 57.] [Dermat.-Urol. Clinic, Kyushu Med. Acad., Kurume.]

Occurring chiefly in summer, this dermatitis first appears as an erythema on exposed surfaces. Yellowish, miliary pustules quickly supervene. Healing may occur at this stage, but more commonly confluence of the pustules is next seen to form greyish sheets the size of a finger tip. These then heal spontaneously in about a week, leaving some pigmentation behind. Burning and pricking sensations are felt throughout the course of the eruption. Although the matter is not yet proved, the author believes the eruption to be due to "Päderus idae Lewis," and so is closely related to the similar diseases seen in Java, India, Congo, Brazil, and elsewhere.

M. S. T.

BARADA (K.). **The Treatment of Eczema by Sodium Bicarbonate in the Tropics.**—*Jl. Egyptian Med. Assoc.* 1931. Feb. Vol. 14. No. 2. pp. 123–125.

In patients who are otherwise apparently healthy but who are suffering from an acute generalized weeping eczema, the author claims striking success with the following drastic treatment. After a very light breakfast 0·3 cc. of camphor oil is injected subcutaneously and hot bottles are also placed round the feet. Then 100 cc. of a 10 per cent. solution of pure sodium bicarbonate is injected intravenously and very slowly. In spite of the above precautions to prevent shock, the respiration gets slower and the pulse weaker. Rigors and a "slight loss of consciousness" sometimes occur. Reaction follows within thirty minutes and lasts three to five hours, with vomiting, shivering and a rise of temperature. Patients are kept in bed for twenty-four hours and the diet is restricted to milk for that period. After a few days a second injection may be necessary, sometimes even a third, but the reaction decreases with each. The cases cited are striking.

M. S. T.

WEHRLE (W. O.) Erfahrungen ueber den "Roten Hund" und dessen Behandlung. [**Prickly Heat and its Treatment (in Liberia).**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1931. Jan. Vol. 35. No. 1. pp. 53–56.

It is noted that predisposition, race, work, etc., all play their part in the causation of prickly heat, and for this reason prophylaxis is not very hopeful. Whilst powders and ointments are sometimes useful in slight cases, Europeans severely affected can only be cured by a change of climate. The author claims that autohaemotherapy not only shortens the attack but that a few injections are always followed by complete disappearance of the irritation. So far he has never had to give more than eight injections of 1 to 4 cc. at 3 to 4-day intervals.

M. S. T.

FACIO (Ludovico). A propósito de una dermatosis regional argentina. Prurigo simple agudo con liquenificación circunscripta de la Patagonia. [**A Regional Dermatitis in the Argentine. Prurigo with Lichenification.**]—*Semana Méd.* 1930. July 17. Vol. 37. No. 29 (1905). pp. 172–191. With 16 text figs.

The author states that he has seen more than 300 cases of this condition and gives details of eight. All those attacked are young adults of the rural population. After a brief period, 24 hours or so of gastrointestinal disturbance, nausea, abdominal pains and diarrhoea, the rash begins to appear on parts usually uncovered, arms, legs and face, generally in the night after an hour or two of intense itching. The eruption passes through three stages: (1) Raised papules topped with a vesicle containing opalescent fluid, coming out during 5 to 8 days; during this period the itching is intense but paroxysmal. (2) The papules give place to a so-called "lichenoid condition" covered with small adherent scabs, often with black crusts of dried blood from scratching. (3) Gradual dying away unless scratching has led to secondary pyogenic infection. There is no fever and the gastro-

intestinal symptoms pass off when the rash appears. If scratching can be resisted the individual spots disappear in a few hours, otherwise the lesions remain for 25 to 30 days. It is clearly of the nature of an intoxication, like urticaria, probably of alimentary origin. The author postulates a predisposing disturbance of hepatic function followed by intestinal intoxication of an allergic character from hypersensibility to albumen of animal origin (meats, eggs, milk). Treatment is dietetic and symptomatic.

H. H. S.

SMITH (E. C.). **Facial Tuberculosis in Nigeria.**—*Jl. Trop. Med. & Hyg.* 1930. May 15. Vol. 33. No. 10. pp. 133–134. [2 refs.] [Med. Research Inst., Lagos, Nigeria.]

The author describes two cases, the first a girl from Lagos aged 15 years and the second a boy from Northern Nigeria aged 10 years. In both the upper lips and alae nasi were affected. It was only when they proved resistant to N.A.B. that the possibility of tuberculosis was considered. Histologically large numbers of giant cells, round and plasma cells and necrotic zones were found. In tissue from the first patient acid-fast bacilli were seen, and some of this material produced facial ulceration after local injection into a monkey. Tissue from the monkey showed many such bacilli and produced tuberculosis in guineapigs.

M. S. T.

HÉRIVAUX (A.). Tuberculose de la peau avec association putride secondaire chronique. Considérations sur les formes masquées de certaines tuberculoses cutanées exotiques. [**Tuberculosis Cutis with a Putrid Secondary Infection. Masked Types of Tuberculosis Cutis seen in the Tropics.**]—*Bull. Soc. Path. Exot.* 1930. June 11. Vol. 23. No. 6. pp. 672–680. With 2 text figs. [13 refs.] [Pasteur Inst., Antananarivo.]

A detailed clinical and pathological account of a lesion over the anterior aspect of the left ankle in a child aged eleven years. The lesion started four years before, was extremely malodorous and was accompanied by glandular enlargement. A series of crusted and painful ulcers exuded a thin, blood-stained pus from which a Proteus was cultivated. An autogenous vaccine was made from this organism and used for local treatment ; the ulcers healed in twelve days. The lesion left was a typical tuberculosis verrucosus, a diagnosis confirmed by successful inoculation into a guineapig. After quoting numerous references the author concludes that typical tuberculosis cutis is rare in the tropics ; on the other hand, the disease itself is not uncommon but is not recognized owing to the intense secondary infections which cause it to resemble mycosis.

M. S. T.

SMITH (E. C.). **Streptococcal Dermatitis.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. June 30. Vol. 24. No. 1. pp. 89–92. With 11 figs. on 3 plates. [Med. Research Inst., Lagos, Nigeria.]

The author divides the various types into three groups : Eczematoid lesions secondary to impetigo of the extremities, bullous eruptions most

common in infants and ulcerated lesions of a chronic character. [Whilst the illustrations are good, the first type does not seem to be sufficiently clearly differentiated from mycotic infections, the second group possibly confuses the true bullae of ordinary impetigo and bullous lichen urticatus, whilst the third type would seem to be ecthyma.] These criticisms may be unjust as it is clearly stated that all lesions heal rapidly under saline dressings or dusting with boric powder.

M. S. T.

SMITH (E. C.). **Sycosis Nuchae.**—*West African Med. Jl.* Lagos. 1930. Apr. Vol. 3. No. 4. p. 79. [3 refs.] [Med. Research Inst., Lagos.]

The article describes in detail all the stages of this chronic disease, good photographs illustrating each. It is probably a true sycosis, staphylococcal in origin. "The cases observed in Lagos were in fairly well-to-do Africans accustomed to wearing European clothes." The patients themselves invariably regard the condition as resulting from a visit to the barber and it is possible that the attentions of a careless barber will predispose to infection from a not over-clean collar.

M. S. T.

IBRAHIM (Aly). **A Rare Surgical Disease in Egypt.**—*Jl. Egyptian Med. Assoc.* 1930. Mar. Vol. 13. No. 3. pp. 66–68. With 3 figs. on 1 plate. [6 refs.]

During the past 20 years the author has seen the three cases on which this article is based, all being men over thirty years of age who had all suffered for over ten years when first seen. The disease starts as a globular swelling in the dermis. It is freely movable over the subjacent tissues and is of the size of a pea. It "soon" becomes slightly raised, the centre then reddens and fluctuates. On breaking down, the sero-purulent discharge has a very characteristic smell. On healing, however, other nodules appear in the vicinity. Sometimes several such abscesses may coalesce and leave short fistulae. The sites of election are the scrotum and perineum, together with the neighbouring "soft-skinned" parts. It may appear in the axillae. All investigations have proved negative. A blood-picture is given, but whilst the differential white cell count is noted the total number of whites is not mentioned. There is no account of attempted treatment or of the ultimate history of the patients.

M. S. T.

MESSIMY (Robert). Vitiligo géant chez les indigènes du Maroc. [**Giant Vitiligo in the Natives of Morocco.**]—*Bull Soc. Path. Exot.* 1930. June 11. Vol. 23. No. 6. pp. 576–581. With 1 text fig.

The author states that this disease is known locally as "Baras" and has been confused with leprosy and syphilis. Twenty cases, all in Berbers, were observed. The affection usually starts with one leucodermic patch on an extremity; after a short time other foci appear on the trunk. These gradually enlarge until, 15 to 20 years after the onset, there is nearly total decoloration of the trunk. At these times the limbs are only partially but symmetrically affected. The face

becomes attacked for the first time 25–40 years after the appearance of the first patch. Clinical and pathological examinations and investigations of past and family histories have yielded no clue as to the cause although the author inclines to the view that it will be found in the nervous system.

M. S. T.

BURGESS (J. F.) & USHER (B.). **On Hypersensitiveness to Quinine.**—*Canadian Med. Assoc. Jl.* 1930. July. Vol. 23. No. 1. pp. 45–48. [General Hosp., Montreal.]

In Canada there is a frequent incidence of dermatitis of the beard region. For this various "after-shave" face lotions have been held responsible. The Canadian Government demands that such alcoholic lotions contain quinine or diethylphenylphthalate, but actually quinine is used almost without exception. Two hundred patients from the skin clinic were chosen at random and the forearms tested with glycerine, alcohol, essential oils, half per cent. lotions of quinine and of colocynth, as well as two proprietary lotions "X" and "Y," the former containing half per cent. of quinine and the latter the same amount of colocynth. Reactions were considered positive only when erythema was accompanied by vesiculation or exudation. A series of patients who were suspected to be suffering from "X" dermatitis were similarly tested. In the first group only one case reacted and this did so both to "X" and the quinine lotion only. Therefore it is unlikely that a quinine idiosyncrasy is responsible. Ten cases of the second group are reported in detail and they prove that quinine only is responsible, that the dermatitis is due to sensitization as a result of prolonged contact and that this sensitization may be local or general.

M. S. T.

HASSELMANN (C. M.) & MIYAO (Isao). Ein erstmalig bei einem Japanerkind in den Tropen beobachteter Fall von Pemphigus vulgaris, vegetans et foliaceus. [**The First Case of Pemphigus Vulgaris in the Tropics observed in a Japanese Child.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1930. June. Vol. 34. No. 6. pp. 295–299. With 2 text figs. [17 refs.]

This disease is very uncommon among the Japanese. The article describes in great detail the fatal case of a boy aged 1¼ years resident in Manila. Not only were the lesions characteristic of Pemphigus vulgaris present, but there were also areas typical of P. vegetans and P. foliaceus. Pathological investigations, etc., yielded no findings of importance.

M. S. T.

MAKEL (H. P.). **"Ainhum."**—*Milit. Surgeon.* 1930. May. Vol. 66. No. 5. pp. 693–695. [4 refs.]

Two cases recently seen in Colon are quoted: both were West Indian negroes and each showed the disease in one little toe only. The author then reviews the definition, history and suggested etiologies of the disease. An account of the pathology, treatment, etc., follows.

In conclusion it is stated that the above cases " seemed to be more of a sort of linear scleroderma in which the epidermis had hardened and shrunk compressing the papillary layer and causing pressure necrosis, obliterating arteritis, following with degeneration of all tissues of the toe, including the bone which was the seat of a rarefying osteitis."

M. S. T.

CASTELLO (P.) & MESTRE (J. J.). Ainhum. Algunas consideraciones referentes a dos casos coincidentes con Lepra y con Keratoderma palmo-plantar hereditaria. [**Ainhum. An Account of Two Cases in Patients also suffering from Leprosy and Congenital Keratoderma.**]—*Bol. Soc. cubana Dermat. y. Sifil.* 1929. Oct. Vol. 1. No. 3. p. 193. With 2 figs. [Summarized in *Bull. Inst. Pasteur.* 1930. May 31. Vol. 28. No. 10. p. 463.]

Only six cases of ainhum have been seen by the author during the last fifteen years in Cuba. One negress was interesting in that 3 cases of ainhum and 4 of keratoderma have appeared in 3 generations of her family.

M. S. T.

HERMANS (E. H.). Een geval van ainhum. [**A Case of Ainhum.**]—*Nederl. Tijdschr. v. Geneesk.* 1930. Apr. 12. 74th Year. 1st Half. No. 15. pp. 1886–1891. With 1 text fig. & 2 figs. on 1 plate. [12 refs.]

The case, which was a typical one, occurred in an Indian sailor and the disease affected the little toe of either foot. Sections were made to include the groove at the base of the toe where the condition was still in an early stage. These showed atrophy of all layers of the epidermis instead of thickening. The stratum granulosum, which is normally 3 to 4 cell layers thick, was reduced to a one-cell layer. In the dermis the collagenous connective tissue of the corium was reduced in amount and there was no trace of any inflammatory cell reaction. No trace, likewise, of scar tissue could be observed. All the various suggestions as to the etiology of the condition are considered—leprosy, trophoneurosis, artificial constriction and inflammatory affection of fissures produced by trauma. The positive outcome of the investigation of this case is that it affords no evidence that an infection with an inflammatory reaction is the cause of ainhum.

W. F. Harvey.

AUBRY (Georges). Un cas d'ainhum chez un Européen. [**Ainhum in a European.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1930. July 21. Year 46. 3rd Ser. No. 25. pp. 1361–1363.

A typical case of ainhum affecting the right fifth toe, of nine months' duration. The patient was a man aged 50, of Italian parentage but born in Algiers. The time during which he has lived in Paris is not, however, mentioned. The patient has some degree of arterio-sclerosis, but all investigations of the endocrine and central nervous systems gave negative results.

M. S. T.

RABELLO (Ed.) Filho. [In Portuguese & English.] Contribuição para a questão das " Botryomycoses." **Contribution to the Study of " Botryomycosis."**—*Rev. Med.-Cirurg. do Brasil.* 1930. Apr. Vol. 38. No. 4. In Portuguese pp. 127–132. With 3 text figs. In English pp. 133–135. [Med. School, Univ., Rio de Janeiro.]

Two cases of the rare disease of man called botryomycosis are briefly described. The condition usually simulates actinomycosis but the grains

are formed of masses of staphylococci. The author favours a return to the name "botryosis" for this disease.

P. Tate.

GAMBIER (A.). Mycétome probable du pied.—*Bull. Soc. Méd.-Chirurg. Indochine.* 1930. July. Vol. 8. No. 7. pp. 753–755. With 1 text fig.

DA FONSECA (Olympio), Jr. O genero Trichosporon. Trichosporoses ou trichomycoses nodosas, piedra européa, piedra asiatica e piedra americana.—*Rev. Med.-Cirurg. do Brasil.* 1930. July. Vol. 38. No. 7. pp. 251–261. With 5 text figs.

DA FONSECA (Olympio), Jr. O genero Madurella, e os mycetomas produzidos pelas especies nelle contidas.—*Rev. Med.-Cirurg. do Brasil.* 1930. July. Vol. 38. No. 7. pp. 262–269. With 2 text figs.

TATE (P.). The Dermatophytes or Ringworm Fungi.—*Biol. Reviews.* 1929. Vol. 4. pp. 41–75. With 7 plates. [39 refs.] [Molteno Inst., Univ., Cambridge.]

TROPICAL MYCOLOGY.

LANGERON (Maurice). Revue des travaux de mycologie pathologique exotique publiés au cours des années 1927–1928. [**Review of Works on Tropical Pathological Mycology published during 1927–1928.**]—Reprinted from *Ann. de Cryptogamie Exot.* 1930. Apr. Vol. 3. No. 1. pp. 13–42. [8 pages of refs.]

This paper is a very useful critical review of work published during the years 1927–1928, in which the real advances in knowledge of pathogenic fungi are well brought out. Under the section Phycomycetes, rhinosporidiosis and coccidioidal granuloma are considered. Under Ascomycetes are included Brazilian and Paraguayan "Piedra." Under Hyphomycetes are considered the Dermatophytes in the broad sense separated into Closterosporaceae; Aleuriosporaceae; Conidiosporaceae; and Blastosporaceae. Under the latter heading blastomycoses in general; pulmonary blastomycoses; "thrush" and glossitis; and cutaneous blastomycoses, are dealt with. The last section deals with the fungi of mycetomas, under the headings Actinomycotic mycetomas, and Maduromycoses. In addition to a full bibliography, a list of all the new genera and species mentioned in the review is appended.

P. Tate.

TALICE (R. V.). Le facteur pH en mycologie. Son influence sur la culture de certaines espèces de champignons parasites de l'homme. [**The pH Factor in Mycology.**]—*Ann. Parasit. Humaine et Comparée.* 1930. Mar. 1. Vol. 8. No. 2. pp. 183–188. With 1 text fig. [14 refs.] [Hyg. Inst., Montevideo.]

The growth of 30 species of fungi was observed over a pH range of pH 2·2 to pH 9·6, the media employed being Raulin, ordinary glucose agar and Sabouraud's "proof" and "preserving" media. The results show that the maximum and minimum reaction for all the species are widely separated and that in most cases optimum growth takes place over a fairly wide range of pH. The optimum range for most species is in the region of pH 5–7, but in Saccharomyces it is about pH 3.

P. T.

JAUSION (Hubert) & SOHIER (Roger). Les claso-vaccins: vaccinothérapie des dermatomycoses et de leurs séquelles allergiques. [**Claso-Vaccines: Vaccinotherapy of the Dermatomycoses and their Allergic Sequelae.**]—*Presse Méd.* 1930. May 7. Vol. 38. No. 37. pp. 621–625. With 6 text figs.

The authors claim to have met with a great measure of success by treating dermatomycoses with a mixed vaccine prepared as follows:—The fungi used are *Trichophyton crateriforme, T. acuminatum, T. cerebriforme, T. lacticolor, T. radians, Microsporum audouini, Achorion schönleinii, Epidermophyton inguinale, E. interdigitale,* and *Sporotrichum beurmanni.* Cultures are grown for two months at laboratory temperature on liquid honey medium in Roux flasks. The liquid is

filtered off, the fluid forming the "toxin filtrate," and the mycelial masses are mixed and treated with nitric acid, first cold and then boiled for 1 hour on a water bath. The acid is neutralized with normal soda, using litmus paper as indicator, and filtered. A drop of "phénosalyl" is added to each 2 cc. of the filtrate, which is distributed in sterile ampoules and forms the claso-vaccine.

Diagnosis was confirmed by intradermal reaction with trichophytine before injecting the claso-vaccine. The usual course consists of a series of 6 injections, 1/2 cc., 1 cc., 1 1/2 cc., 2 cc., 2 1/2 cc., 3 cc., at intervals of 5 days; but, if necessary, twice the number of injections may be given.

The results of treating 45 cases of dermatomycoses are given, together with short clinical histories of the cases. 36 were cured; 9 improved; and 3 had relapses. Of the nine cases which showed only improvement, 7 were cases of pityriasis versicolor. The cured cases included: scalp trichophytosis, 1; favus, 1; sporotrichosis, 1; kérion of Celsus, 1; trichophytic sycosis, 1; herpes circinata, 9; eczema marginatum of Hebra, 7; erythrasma, 2; mycotic intertigo, 3.

In addition 17 cases of eczema associated with past or present dermatomycoses, and including parakeratoses psoriasiformes, eczematides pityriasiformes and trichophytides psoriasiformes and licheniformes, were treated in a similar manner and resulted in 10 cures and 10 improvements, but after cure there were relapses in 3 cases.

P. T.

i. Ashford (Bailey K.). **Significance of Mycology in Tropical Medicine.**—*Arch. Dermat. & Syph.* 1930. July. Vol. 22. No. 1. pp. 7–33. With 3 text figs. [4 pages of refs.]

ii. ——. **Sporotrichosis.**—*Bol. Asoc. Méd. de Puerto Rico.* 1930. Aug. Vol. 22. No. 179. pp. 127–133.

i. The first paper is a general review of the fungi which cause mycoses in tropical countries, in which the author points out that from one-third to one-half of tropical skin diseases are of mycotic origin. He emphasizes that probably all pathogenic fungi are primarily saprophytic, and that the condition of the host is of great importance in regard to their becoming parasitic. Blastomycoses, dermatomycoses, sporotrichosis, mycetoma, actinomycoses, and a number of uncommon diseases caused by Ascomycetes and Phycomycetes are included in the review.

ii. The second paper consists of a review of the etiological, geographical, clinical and laboratory aspects of sporotrichosis.

P. T.

In (Keiden). **A Study of Dermatophytes along the Shores of the Lower Course of the Yang-Tse-Kiang. (I.)**—*Japan. Jl. Dermat. & Urol.* 1929. Sept. Vol. 29. No. 9. pp. 879–906. With 34 text figs. & 4 figs. on 1 plate. [In Japanese. English summary pp. 59–62.] [Dermat. Clinic, Imperial Univ., Tokyo.]

In the course of this investigation 127 cultures were obtained from infected material. The author found that the term "la-li-dau" is used exclusively for favus; and in 48 out of 49 cases diagnosed as "la-li-dau" cultures of *Achorion schönleinii* were obtained. The

remaining case clinically resembled favus; but the fungus isolated differs in cultural characters and in morphology from the known species of Achorion and appears to be a new species of this genus. Inoculation was positive for rabbits, and on the glabrous skin of man, but negative for guineapig, mice and chicken.

P. T.

FRAZIER (Chester N.), KUROTCHKIN (T. J.) & MU (Jui-wu). **Types of Dermatomyces isolated from Scalp Infections in Peiping.**—*Nat. Med. Jl. China.* 1930. Apr.–June. Vol. 16. Nos. 2 & 3. pp. 168–170. [2 refs.] [Peiping Union Med. College, Peking.]

In general hospital practice examination of 165 cases of scalp ringworm showed that *Trichophyton violaceum*, *Microsporum ferrugineum* and *Trichophyton* "*A*" are the most common fungi; but *T. cerebriforme* and *Achorion schönleinii* were also found in a few cases. In 8 cases mixed infections were present. Four of these gave cultures of *M. ferrugineum* and *T.* "*A*"; and the other four gave cultures of *T. violaceum* and *M. ferrugineum.*

P. T.

CATANEI (A.). Cultures d'*Achorion schönleini* et de *Trichophyton* sur milieux artificiels en présence de microbes et de produits microbiens ou sanguin. [**Cultures of** *Achorion schönleinii* **and** *Trichophyton* **on Artificial Media in the Presence of Bacteria and of Bacterial and Blood Extracts.**]—*Arch. Inst. Pasteur d'Algérie.* 1929. June. Vol. 7. No. 2. pp. 184–201. With 3 plates (1 coloured) & 1 text fig. [6 refs.] [Pasteur Inst. of Algeria, Algiers.]

In mixed cultures of *Achorion schönleinii* with a Staphylococcus, the fungus at first grows better than in pure culture, but the favourable effect ceases after a few weeks. This action is also shown by some bacilli and cocci. The favourable effect of the bacteria is reduced by their abundant presence in the mixed culture, and by a high temperature. The life of the mixed cultures is sometimes shorter than that of pure cultures. On favourable media the fungus benefits for the first few weeks if planted on a culture of bacteria previously grown on the medium, but on poor media the growth of the fungus is not improved. Slow growing Trichophytons do not grow in mixed cultures; quickly growing species are retarded in mixed cultures at a temperature favouring the bacteria; and the bacteria have no effect at an unfavourable temperature in mixed culture with a rapidly growing Trichophyton. Small quantities of a Staphylococcus culture in broth killed by heat, of filtrate of such a culture, or of bacterial extract, favour the growth of Achorion in artificial media, but the action is temporary when the medium by itself is suitable for growth of the fungus.

P. T.

CATANEI (A.). Etude des modifications des caractères culturaux d'un *Trichophyton gypseum.* [**Study of the Cultural Modifications of a** *Trichophyton gypseum.*]—*Arch. Inst. Pasteur d'Algérie.* 1929. Sept.–Dec. Vol. 7. No. 3–4. pp. 287–302. With 3 plates. [3 refs.] [Pasteur Inst. of Algeria, Algiers.]

From cultures of a *Trichophyton gypseum* which differs slightly from *T. radiolatum* Sab. 1910, three variants, types 1 and 2 and a yellow type,

were obtained, which are stable in culture, and, like the primary cultures, may undergo white downy pleomorphic changes. The three types, which differ in cultural characters and in the relative degree of aleurie development, appear to form a series of gradations from the primary culture type to the completely pleomorphic white, downy, type. Two of the variants were stable through animal inoculation, but the third reverted either to the primary culture type or to that of the second variant.

P. T.

DE MAGALHÃES (Octavio). [In Portuguese & English.] Contribuição para o conhecimento das lesões provocadas pelo "Oidium brasiliense" (O. Magalhães—1914). **Contribution to the Knowledge of Lesions caused by the "*Oidium brasiliense*" (O. Magalhães 1914).**—*Mem. Inst. Oswaldo Cruz.* 1929. Vol. 22. In Portuguese pp. 27–36. With 28 plates (2 coloured). In English pp. 37–47. [With 88 pages of refs.]

The lesions produced by *Oidium brasiliense* in the various organs—heart, lungs, kidneys and adrenals, spleen, ganglia, thyroid, pancreas, liver—were studied in man, monkey, rat, mouse, guineapig and rabbit, and in the present paper a brief account of the type of lesions found in the different organs is given. The author's main points seem to be that the lesions are not specific for the organism and that in different tissues the organism may be present in a variety of forms—"coccus," "bacilli," "navette," "yeast," "mycelial," etc. [Unfortunately, the English translation is so bad that it is almost impossible to understand, and the immense bibliography appended is merely a haphazard collection of titles of papers, and summaries of papers, which touch on all aspects of mycology, and the vast majority of which have no bearing on the subject of the paper.]

P. T.

DE ALMEIDA (Floriano Paulo). Différences entre l'agent étiologique du granulome coccidioïdique des Etats-Unis et celui du Brésil. Nouveau genre pour le champignon brésilien. [**Differences between the Etiological Agents of Coccidioidal Granuloma in the United States and in Brazil. New Genus for the Brazilian Fungus.**]—*C.R. Soc. Biol.* 1930. Nov. 4. Vol. 105. No. 29. pp. 315–316. [1 ref.]

The author suggests that owing to the cultural, morphological and pathogenic differences between the organisms found in coccidioidal granuloma in the United States and in Brazil, the new genus *Paracoccidioides* should be founded for the United States fungus. The type species would be *Paracoccidioides brasiliensis* (Splendore 1912).

P. T.

PUNTONI (V.). Sur la pluralité des types de l'*Actinomyces bovis* Harz. [**Plurality of *Actinomyces bovis* Harz.**]—*C.R. Soc. Biol.* 1930. Feb. 7. Vol. 103. No. 5. pp. 303–305. [Bact. Inst., Univ., Rome.]

Cultures of 20 strains of *Actinomyces bovis* Harz, obtained from Italian and other institutes, were compared. The 20 strains varied and appeared to be composed of a number of distinct species. These species could be identified with previously known saprophytic species, namely, *A. solphureus* Gasperini (12 strains); *A. albus* (Rossi-Doria) (1 strain); *A. chromogenes* Gasperini (1 strain); *A. albido-flavus* (Rossi-

Doria) (1 strain); and *A. carneus* (Rossi-Doria) (1 strain). From this the author concludes that actinomycosis with grains having clubs is due to species of *Actinomyces* well known as ordinary saprophytes; that the name *A. bovis* Harz should be abolished; and that the division of Actinomyces into *saprophytica* and *parasitica* cannot be retained.

P. T.

De la Guardia (Jaime). Breves notas sobre un caso de actinomicosis. [**Brief Notes of a Case of Actinomycosis.**]—*Cronica Méd.-Quirurg. Habana.* 1930. Mar. Vol. 56. No. 3. pp. 114–121. With 7 figs.

The patient, a woman of 20 years, engaged in domestic work, gave a 5 months' history of pain over the right lower jaw. This had been ascribed to caries of the teeth which were extracted. The pain continued and swelling began two months later affecting the whole of the right side of the face and a fungating ulcer appeared externally at the angle of the mandible. The ray fungus was cultivated from it. Treatment by excision and scraping, cauterizing with pure carbolic acid and dressing with Lugol's iodine, together with administration of potassium iodide by mouth following six injections of 2 gm. of the sodium salt intravenously at three-day intervals, resulted in cure.

H. H. S.

Talice (R. V.). Sur la filamentisation des *Monilia.* [**Formation of Hyphae in Monilia.**]—*Ann. Parasit. Humaine et Comparée.* 1930. July 1. Vol. 8. No. 3–4. pp. 394–410. [35 refs.] [Parasit. Lab., Faculty of Med., Paris.]

Monilias are commonly "dimorphic" in the sense that they may grow in a yeast-like, blastosporous, form or, under certain conditions, may develop hyphae. This phenomenon was investigated in 30 strains of Monilia isolated from the mouth, sputum or faeces of healthy or unhealthy human subjects, and from hedgehogs.

The tendency of these fungi is to develop in the blastosporous form, and repeated culture in this form may give rise to a race of Monilia entirely yeast-like, or nearly so. The hyphal form is essentially a young one and is found in early cultures on nearly all media. Development of hyphae is favoured by adverse conditions of growth, including reduced oxygen tension and poor nutritive media which, however, contain both proteins and carbohydrates. A less important factor is liquid media, the most suitable being potato-water medium containing 2–3 per cent. of grated potato. A temperature of 37° C. is the optimum for hyphal formation and is sometimes essential for it.

P. T.

Lim (C. E.) & Kurotchkin (T. J.). **The Action of Certain Dyes and Drugs upon Pathogenic** *Monilia tropicalis.*—*Nat. Med. Jl. China.* 1930. Apr.–June. Vol. 16. No. 2/3. pp. 215–222. [9 refs.] [Peiping Union Med. College, Peking.]

These experiments, made in the Division of Bacteriology, led the authors to the following conclusions:—

"1. Several substances have been tested for their fungistatic and fungicidal power against *Monilia tropicalis* and it was found that although the fungistatic property of gentian-violet and brilliant green was high, the fungicidal power of both dyes was of no practical significance.

"2. The fungistatic and fungicidal properties of other drugs, as mercurochrome, acriflavine, rivanol and neo-salvarsan were, in general, too low to suggest the possibility of the therapeutic application of these substances.

"3. It was also found that the intravenous injections of gentian-violet, mercurochrome, acriflavine, rivanol, neo-salvarsan and immune anti-monilia serum could not prevent the development of a fatal mycotic septicemia in rabbits experimentally infected with *Monilia tropicalis*" [isolated from the sputum in a fatal human lung infection].

A. G. B.

KUROTCHKIN (T. J.) & LIM (C. E.). **The Effect of Animal Passage upon Pathogenic Monilia.**—*Nat. Med. Jl. China.* 1930. Aug. Vol. 16. No. 4. pp. 332–337. With 4 figs. on 2 plates. [5 refs.] [Peiping Union Med. College, Peking.]

The experiments were carried out with a strain of Monilia isolated from a fatal case of bronchomoniliasis. Cultures were grown on Sabouraud's maltose agar at 37° C. for 24–36 hours, and hamsters (*Cricetulus griseus*) were used as test animals. When newly isolated an injection of 18 million monilia cells was required to kill hamsters in 48 hours. After being cultivated on Sabouraud's medium for 3 months the minimum lethal dose increased to 270 million monilia cells. After passage through 30 hamsters the minimum lethal dose decreased to 10 million cells. Inoculation of very large doses resulted in death in 24–36 hours from mycotic septicaemia; inoculation of moderate doses caused death in 3 days from mycotic pyaemia.

P. T.

HOFFSTADT (Rachel E.) & LINGENFELTER (John S.). **A Pulmonary Infection caused by** *Monilia balconica* **(Castellani).**—*Amer. Jl. Trop. Med.* 1929. Nov. Vol. 9. No. 6. pp. 461–469. With 4 figs. [7 refs.] [Dept. of Bact. & Path., Univ., Washington, & Polyclinic, Seattle, Washington.]

An atypical strain of "*Monilia balconica* Castallani" [presumably *Monilia balcanica* Castellani, but the spelling of the authority is given variously as Castallini, Castallani and Gastallani in the text, and *balcanica* is spelled *balconica* throughout] was isolated from the sputum of a patient with a pulmonary infection. *M. balcanica* has been found by CASTELLANI in digestive cases in the tropics, but has not previously been isolated from a case of pulmonary infection. Intraperitoneal and intrapleural inoculation of guineapigs with broth cultures resulted in abscesses at the point of inoculation and marked congestion of the lungs. Complement fixation reactions were obtained in the patient and in a rabbit which had been inoculated intravenously with cultures. Agglutination tests failed.

P. T.

PANAYOTATOU (Angelica). **A Case of Castellani's Broncho-Moniliasis with** *Monilia alessandrina* **as the Aetiological Agent.**—*Jl. Trop. Med. & Hyg.* 1930. Jan. 15. Vol. 33. No. 2. pp. 17–18. [2 refs.]

A case of bronchomoniliasis is reported which clinically resembled pulmonary tuberculosis and is peculiar in that the causative organism appears to have been a Monilia of the *zeylanica* type. It differs from *M. zeylanica*

in having white cultures, and the author describes it as a new species under the name *Monilia alessandrina.* Treatment, mostly with potassium iodide, was successful.

P. T.

WHEELON (Homer) & HOFFSTADT (Rachel E.). **Bronchomoniliasis caused by** *Monilia Metalondinensis.*—*Jl. Lab. & Clin. Med.* 1929. Nov. Vol. 15. No. 2. pp. 122–124. With 1 text fig. [4 refs.]

Cultures of *Monilia metalondinensis* Castellani were obtained from the sputum of a patient whose condition had been diagnosed as acute general respiratory infection of an influenzal type. The condition improved under symptomatic treatment. Animal inoculation with cultures was negative.

P. T.

i. NORRIE (F. H. B.). **Rhinosporidium Infection of the Nose, with a Report of Five Cases.**—*Jl. Laryngol. & Otol.* 1929. Aug. Vol. 44. No. 8. pp. 505–513. [6 refs.]

ii. CHERIAN (P. V.) & VASUDEVAN (A.). **A Case of Rhinosporidiosis in the Female.**—*Ibid.* pp. 518–519. With 2 plates (1 coloured).

i. The author has been on the look-out for Rhinosporidium since 1922, but though 9,622 cases have been seen in the ear, throat and nose department of an outdoor general dispensary at Calcutta in that period, only 5 cases of rhinosporidiosis have been diagnosed, i.e., about 1 in 1,924 cases. Four were in males, one in a female; all cases reported hitherto have been in males. The chief symptoms were nasal obstruction and watery discharge from the nose; no purulent discharge or oozing of blood. Examination of the secretion showed the characteristic spores, which may be stained with Leishman. The anterior part of the nose would appear to be the favourite site; the tumours arise in the mucous membrane, and the appearance is distinctive. Treatment is by dissection and is usually satisfactory. In one patient, however, the duration was 16 years and several operations had been done.

ii. A case described from Malabar with a good coloured illustration of the tumour in situ and (less good) of the microscopical appearances. [The first author gives references but not of ASHWORTH's chief paper (*Trans. Roy. Soc. Edinb.*, 1923, Vol. 53, Part 2, p. 301).]

A. G. B.

PARODI (Silvio). La rinosporidiosis en Sudamerica. [**Rhinosporidiosis in South America.**]—*Medicina Países Cálidos.* Madrid. 1930. Jan. Vol. 3. No. 1. pp. 55–62. With 3 text figs.

Recorded cases of this condition are very few. The author mentions the cases of SEEBER and MALBRÁN, and now adds two more, a young man of 19 years and a boy of 12 years, both from the neighbourhood of Buenos Aires. Microphotographs are reproduced showing the tissue changes and the parasite. He notes that in Uruguay LASNIER had one human case (not published) and in Paraguay two were described by MIGONE. All were males and all field-labourers.

H. H. S.

PEREIRA, Jr. [In Portuguese & English.] Culturas da *Piedra brasileira* (Piedraia sarmentoi n. sp.). **On the Cultures of Brazilian Piedra** (*Piedraia sarmentoi* **n. sp.**).—*Rev. Med.-Cirurg. do Brasil.* 1930. Feb. Vol. 38. No. 2. In Portuguese pp. 49–50. In English pp. 51–52. With 6 plates (1 map).

——. Cultures de "Piedra" brésilienne: *Piedraia sarmentoi* n. sp.—*C.R. Soc. Biol.* 1930. June 20. Vol. 104. No. 21. pp. 680–682.

The nodules on the hairs in cases of Brazilian piedra are formed of a mosaic of double-contoured cells surrounded by hyphae; and in the more developed nodules Horta's cysts with vermiform spores [asci and ascospores according to LANGERON's interpretation] are present. Two fungi were grown from nodules, one of which is similar to *Trichosporum beigeli*, while the other appears to be a new species of the genus *Piedraia* recently founded by DA FONSECA and LEAO. It differs from *P. hortai* in the following characters:—Rapid growth on Sabouraud's medium; colour white at first, becoming black and fuliginous with age; cultures easily detachable from medium; on potato growth is slow and scanty and pigment development is delayed. The name *Piedraia sarmentoi* n. sp. is proposed for it. P. T.

PANAYOTATOU (Angélique). Sur les mycoses en Egypte. Amygdalites mycosiques à Alexandrie (d'Egypte). [**Mycotic Tonsillitis in Alexandria, Egypt.**]—*Rev. Méd. et Hyg. Trop.* 1929. Nov.–Dec. Vol. 21. No. 6. pp. 184–187.

Four cases of tonsillitis were observed in which the bacillus of Loeffler was not present, but fungous elements were plentiful. *Monilia metalondinensis* Castellani was cultivated from two of the cases and *Monilia tropicalis* Castellani from the other two. Treatment with alkaline washes and gargles, and with phenolized glycerine and glycerine with tincture of iodine was rapidly curative. P. T.

CASTELLANI (Aldo). **Fungal Diseases of the Tonsils (Tonsillomycoses).**—*Jl. Trop. Med. & Hyg.* 1930. June 16. Vol. 33. No. 12. pp. 165–180. With 31 text figs. [11 refs.]

Mycoses of the tonsils, which it is claimed are not rare, are clinically divided into acute tonsillomycoses and chronic tonsillomycoses. Acute tonsillomycoses are mostly due to yeast-like fungi of the genus Monilia, but sometimes are caused by species of Cryptococcus, Endomyces, Saccharomyces and other genera. Chronic tonsillomycoses may be caused by fungi of the genera Actinomyces, Cohnistreptothrix, Hemispora and Oidium. In all cases the prognosis is generally favourable; and treatment mainly consists of dilute tincture of iodine locally and, in chronic cases, potassium iodide internally. P. T.

CASTELLANI (Aldo). **Urethromycoses of the Male, and Vulvovaginomycoses.**—*Jl. Trop. Med. & Hyg.* 1929. Dec. 16. Vol. 32. No. 24. pp. 357–358. [5 refs.]

Various fungi have been observed in, and cultivated from, discharges present in cases of urethritis and vaginitis. The discharges may be whitish, red or black, and in some cases the colour is due to the presence of pigment-producing bacteria. P. T.

WEISS (Pedro). Sur un *Sterigmatocystis* agent d'une dermatose semblable au pityriasis versicolor flava: *S. cinnamominus* n. sp. [**On *Sterigmatocystis cinnamominus* n. sp. causing a Dermatitis resembling Pityriasis versicolor flava.**]—*Ann. Parasit. Humaine et Comparée.* 1930. Mar. 1. Vol. 8. No. 2. pp. 189–193. With 1 text fig. [4 refs.]

The patient, who had always lived in Peru, for several years had patches resembling pityriasis versicolor flava, chiefly on his neck and chest. Hyphae and spores were present in scales from the patches and, when inoculated on Sabouraud's media, gave cultures of a fungus, which is regarded as a new species and is named *Sterigmatocystis cinnamominus.*

The optimum temperature is 30°–37° C., and growth is at first white and downy and later becomes cream in the centre. The cream colour gradually spreads all over the colony and becomes darker until it may assume a chocolate shade. Conidiophores are simple, 5 microns thick, and terminate in globose heads 12 × 9 microns, bearing sterigmata 4 microns long, each of which bears 2–4 secondary sterigmata 5–6 microns long, from which arise chains of conidia 1–2 microns in diameter and brown in colour. A peculiar character is that hyphae give rise to large numbers of external lateral spores, which are spherical, 3–4 microns in diameter, and may be borne directly on the hyphae or on sterigmata. White downy pleomorphic tufts appeared on the surface of old cultures, and, when separated, grew as clear cream coloured colonies in which conidiophores were formed but never bore conidia and only developed monstrous sterigmata.

Inoculation of a woman with mycelium from third subcultures was positive after 15 days and microscopically scales from the lesions resembled those from the original case.

Cultures were pathogenic to rabbits by scarification (2 inoculated of which 1 died); and spores were pathogenic by subcutaneous inoculation to a rabbit.

P. T.

SARTORY (A.), MEYER (M.) & MEYER (J.). Contribution à l'étude des mycoses osseuses: trois cas d'ostéites dues d'une part à l'*Actinomyces asteroides* (Eppinger) et d'autre part à l'*Hemispora stellata* (Vuillemin). [**Three Cases of Mycotic Ostitis.**]—*Ann. Inst. Pasteur.* 1930. Mar. Vol. 44. No. 3. pp. 298–329. With 8 text figs. [10 refs.]

Three cases of ostitis are described in detail. They were first considered to be tuberculous, but fungi were isolated from the lesions and it appears that they were the causal organisms: In the first case the clinical and radiographic features of the lesions were characteristic, the latter differing markedly from the radiographic picture in tuberculous bone lesions. Operation and treatment with iodides was curative. From this case *Actinomyces asteroides* (var. *serratus*) was isolated. Cultures were pathogenic to guineapigs, and, when inoculated into the tibia of a dog, caused a progressive ostitis for 5 weeks, followed by gradual regression and, ultimately, spontaneous cure.

The causal fungus in the two other cases was *Hemispora stellata*, with cultures of which mycotic ostitis was experimentally reproduced in dogs. Operation and dressing the lesions with iodoform-glycerine and internal treatment with sodium iodide resulted in cure.

P. T.

PEREIRA, Jr. [In Portuguese & English.] *Sporotrichum fonsecai* e o diagnostico differencial dos esporotrichados. (2a nota prévia.) *Sporotrichum fonsecai* **and the Differential Diagnosis of the Sporotrichales.**—*Rev. Med.-Cirurg. do Brasil.* 1930. May. Vol. 38. No. 5. In Portuguese pp. 163–170. In English pp. 170–174. With 84 figs. on 24 plates.

From lesions on the nose of a girl aged 12 years a new species of Rhinocladium was isolated, which is named *Rhinocladium fonsecai*, and of which the morphology and cultural characters are described. Cultures are pathogenic for white mice and rats. Treatment with potassium iodide led to a complete cure in about six weeks.

P. T.

SCOTT (Ernest L.) & MCKINLEY (Earl B.). **Effect of Ultraviolet Light upon Genus Trichophyton.**—*Proc. Soc. Experim. Biol. & Med.* 1930. Mar. Vol. 27. No. 6. pp. 598–599. [School of Trop. Med., Univ. of Porto Rico, San Juan, & College of Physicians & Surgeons, New York.]

A culture of *Trichophyton asteroides* was ground up in physiological saline solution and exposed to ultraviolet light in quartz tubes. The source of light was an alpine sun lamp, and the tubes were placed at a distance of one foot from the lamp. Exposure to the light of 5 to 20 minutes' duration killed the fungus.

P. T.

ASHFORD (Bailey K.), MCKINLEY (Earl B.) & DOWLING (George B.). **Experimental Inoculation of Monkeys** (*Silenus rhesus*) **and Guinea Pigs with Two Dermatophytes and One Blastomycoides.**—*Porto Rico Jl. of Public Health & Trop. Med.* 1930. June. Vol. 5. No. 4. pp. 452–457. With 2 figs. on 1 plate. [9 refs.] [School of Trop. Med., Univ. of Porto Rico, San Juan.]

Monkeys and guineapigs were successfully inoculated with *Trichophyton asteroides* by abrading the shaved skin of the abdomen with sandpaper and rubbing 1 cc. of an emulsion of *T. asteroides* into the scarified area. The presence of the fungus in the experimental lesions was confirmed by direct examination of the scales and by culture. Hypodermic and subcutaneous inoculation failed to produce infection in monkeys.

The same technique was used in inoculating *Sabouraudites rubrum* and *Blastomycoides aurea* to monkeys, with negative results in the former case, and with doubtful success in the latter.

P. T.

PEÑA (Raul). [In Portuguese & English.] A proposito de um caso de mycetoma podal de grãos brancos observado em Asunción, proluzido pelo *Scedosporium apiospermum.* **On a Case of Foot Mycetoma, with White Grains, observed in Asunción and produced by "Scedosporium apiospermum."**—*Rev. Med.-Cirurg. do Brasil.* 1930. Apr. Vol. 38. No. 4. In Portuguese pp. 142–145. With 1 text fig. In English pp. 145–147. [Oswaldo Cruz Inst., Rio de Janeiro.]

——. A propos d'un cas de mycétome à grains blancs observé à Assomption (Paraguay) et produit par le *Scedosporium apiospermum.*—*C. R. Soc. Biol.* 1930. June 20. Vol. 104. No. 21. pp. 689–690. [Oswaldo Cruz Inst., Rio de Janeiro.]

Cultures of the fungus obtained by DELAMARE and GATTI from a case of mycetoma with white grains [see this *Bulletin*, Vol. 27, p. 522] were studied on various media. As a result of this investigation the fungus is identified as *Scedosporium apiospermum* Saccardo 1911.

P. T.

REVIEWS AND NOTICES.

PEARCE (Louise) [M.D.]. **The Treatment of Human Trypanosomiasis with Tryparsamide. A Critical Review.**—*Monographs of the Rockefeller Inst. for Med. Research.* New York. 1930. Aug. 15. No. 23. 339 pp.

In her introduction the author points out that eight years have now elapsed since the institution in the Belgian Congo of the tryparsamide treatment of sleeping sickness. In the intervening years the use of the drug has constantly increased throughout Tropical Africa and there has accumulated a considerable literature on the subject.

The object of the present monograph is to subject to critical analysis the available records of cases which bear on tryparsamide therapy of African sleeping sickness. The total number of cases considered is 1,848, the majority of which were in an advanced stage of the disease. The author writes that it is certain that a drug adapted to general use in African sleeping sickness must possess properties of biological action which render it applicable to the treatment of patients in the advanced as well as the early stage of the infection. Furthermore, the incidence and distribution of the disease impose the necessity of large scale administration under field conditions. In the present review the drug is considered from both these important points of view.

The first three chapters deal with biological considerations ; the source, materials and methods of the present analysis ; and administration and dosage. Chapter IV relates to complications of drug administration. The author points out that the use of tryparsamide in human trypanosomiasis has been singularly free from untoward effects other than visual complications of a low incidence and usually of a transitory character. While the possibility of amblyopia should be fully recognized, it may be stated at once that its occasional occurrence is not a deterrent to the use of the drug. The condition has occurred practically only in the second stage of the disease, and then generally in very advanced cases. As a rule, if the drug is discontinued on the appearance of the first symptoms, e.g., diminished visual acuity, recovery takes place, but in certain instances the condition becomes more pronounced and a permanent disability may result which may be as serious as complete blindness. After summarizing the literature bearing on this subject, Pearce states that it is generally agreed that with advanced cases in particular visual complications may be largely avoided by employing a system of small or medium sized doses or of greater doses given at intervals of not oftener than once a week. VAN DEN BRANDEN advocated doses of 2 gm., whilst KELLERSBERGER gives 2 and 3 gm. doses. CHESTERMAN is of opinion that doses of 4 gm. and LAIGRET that doses of 3 gm. should not be exceeded. It is now generally agreed that the method of graduated doses, especially in very advanced cases, greatly reduces the chances of amblyopia. The whole question of amblyopia is discussed in the detail which so important a subject demands.

Chapter V discusses the therapeutic results obtained in early cases of *gambiense* infection, and Chapter VI the results in advanced cases of *gambiense* infection in the Belgian Congo. The next two chapters are devoted to the therapeutic results in advanced cases of *T. gambiense* infection in the Cameroons and in French Equatorial Africa respectively.

In Chapter IX the author considers the cause of failures in *T. gambiense* infections. She remarks that the number of definite failures is small considering the advanced character of the disease in a large number of cases. The instances of death were practically all in very advanced or moribund patients. The blood relapses of the cases in which the cell

content of the spinal fluid was little affected were, for the most part, examples of a less advanced infection. The dosage administered in the failures was, in general, insufficient. Many cases received much less than 25 or 30 gm. and treatment was irregular in a number of instances. The time at which failures were observed is interesting. In the majority of cases it occurred within six months of the termination of treatment. At the end of this chapter, the author writes as follows :—

> "The analyses of failures embodied in this chapter emphasize three important aspects of tryparsamide therapy of advanced cases. Peripheral relapses have been observed, although rarely, in this stage of the infection. Blood examinations are, therefore, theoretically essential as a control of the results of treatments. In the second place, the appropriate method of treating very advanced patients appears to be one of graduated doses, and it is highly essential that a sufficient amount be given before treatment is interrupted. It is probable that the first course should consist of not less than 25 to 35 gm. To obtain the best results, moreover, the injections should be given regularly. Finally, it should be pointed out that the proportion of satisfactory results in advanced cases of infants and children has been definitely lower than in adults. The dosage administered was comparable to that given adult patients. Certain authors have drawn attention to the fact that the disease in young individuals is apt to be unusually severe and rapid, and these observations, together with the evidence furnished by the present discussion, indicate that the infection in children is more difficult to influence than that of adults. In view of Chesterman's findings, however, that children tolerate approximately twice the adult dose of tryparsamide per unit of body weight, it will be necessary to await the results obtained by a higher dosage before an evaluation of the treatment of this class of patients can be made."

Chapter XI deals with the results obtained with *T. rhodesiense* infection. Unfortunately, the information available is comparatively limited. It seems clear, however, that, as far as the blood stream infection is concerned, the action of the drug administered in 2 and 3 gm. doses at weekly intervals is relatively insignificant. Most observers are of opinion that tryparsamide has a place in the therapy of *rhodesiense* infection, but that it should be administered subsequent to initial treatment with Bayer 205. [As the author points out, however, this method has been tried in too few cases to permit of sound judgment.]

The last chapter consists of a general discussion of the reports concerning the use of tryparsamide in the therapy of human trypanosomiasis. In an appendix details of the results of treatment of a large number of cases are given in tabular form.

The report, which has evidently entailed an enormous amount of work, should prove of great value to those engaged in the treatment of human trypanosomiasis.

W. Yorke.

MANTEUFEL (P.) & TAUTE (M.). **Trypanosen des Menschen.** [Human Trypanosomiasis.]—*Handbuch der pathogenen Mikroorganismen.* [Kolle u. Wassermann.] 1930. Band 7. Lfg. 46. pp. 1139–1310. With 51 text figs. & 2 coloured plates.

This article is a thoroughly good and up-to-date account of human trypanosomiasis in all its aspects. In general arrangement that of previous editions of the "Handbuch" is followed but it is evident that each section has been carefully revised so that nothing of importance has been omitted. This being the case it would seem unnecessary in a review to do more than

recommend the article to all those who can read German and who wish to obtain a good general knowledge of the subject. Nevertheless a few points may be noted. The recent work of the League of Nations Commission, particularly with reference to the pathology of the African disease and the vexed question of the relationship of *Trypanosoma rhodesiense* to *T. brucei* and that of both of these to *T. gambiense*, is carefully described. As regards this relationship, though the authors incline to the view favoured by KLEINE that *T. rhodesiense* is merely *T. gambiense* which has been introduced into a hitherto unexposed population and that the former is distinct from *T. brucei*, the claims of other investigators who disagree are not ignored. The work which has shown that trypanosomiasis has a profound influence on sugar metabolism in the body is described, as also the results of investigations on the adhesion or Rieckenberg phenomenon. On the subject of treatment the place of tryparsamide and germanin (Bayer 205) is clearly defined and no unwarranted claims are made for the superiority of the latter over other remedies. On the subject of prophylaxis the relative merits of removal of population from infected areas, described as the English method, active anti-fly campaigns in the vicinity of human habitations, styled the German method, and the employment of drugs to cure or prevent infections are discussed. Twenty-four of the 154 pages of the article are devoted to South American human trypanosomiasis. Again the account is an excellent one, much attention being paid to the more recent experiences of the disease in the Argentine which have tended to modify views regarding symptomatology. It seems very doubtful if cretinism and myxoedema are caused by the trypanosome as CHAGAS had originally supposed. These are but a few illustrations of the thoroughness with which the authors have revised the original article. The present one is undoubtedly the best general account of these two diseases of Africa and South America. It has a sufficiency of good text figures, two coloured plates of the insect vectors and in addition eighteen pages of the more important references.

C. M. Wenyon.

LYNCH (Kenneth M.) [M.D., Professor of Pathology, Medical College of the State of South Carolina, Charleston, South Carolina]. **Protozoan Parasitism of the Alimentary Tract. Pathology, Diagnosis and Treatment.**—pp. xvii+258. With 37 text figs. 1930. New York: The Macmillan Company. [16s.]

So many books have appeared in recent years in which the intestinal protozoa of man have been fully dealt with that at first sight there would seem to be no necessity for another. Yet this little book fills a gap left by the others, for it is written especially for the medical practitioner and those who work in clinical laboratories. It serves as a guide to the subject in that it explains sufficiently clearly without unnecessary detail the structure, life-history and habits of these organisms and at the same time warns its readers against the acceptance of unestablished views. Those who read the book will have a clear conception of the relation of the intestinal protozoa to the host and will not be led astray by enthusiasts who think the mere presence of a protozoon in the alimentary canal affords an explanation of whatever disease the patient is suffering from and is an indication for some drastic line of treatment. The advice given is sound and is based on many years' experience of the difficulties of diagnosis, of the mistakes which are frequently made, and of the futility of condemning patients to courses of treatment to eradicate infections which have never been proved to be anything but harmless. Full attention is given to the methods of transmission of these parasites and the part played by animals as possible reservoirs. The question whether *Entamoeba histolytica* is an obligatory parasite of the intestinal wall or whether it may sometimes confine itself in a harmless capacity to the lumen of the bowel is carefully

discussed, as also that of the possibility of the encysted form excysting in the host without leaving the body. On both these questions, as on many others for which there is insufficient evidence to give a definite answer, the author very rightly keeps an open mind. The various treatments recommended are up to date, all due consideration being given to emetine, yatren and stovarsol and the dangers connected with their administration. The book is undoubtedly a useful one and with its admirable tone of moderation should do much to promote a clear understanding of the part played by intestinal protozoa in the causation of disease in man.

C. M. Wenyon.

CASTELLANI (Aldo) [K.C.M.G., D.S.C., M.D., F.R.C.P., Director of Tropical Medicine, Ross Institute, etc.]. **Climate and Acclimatization. Some Notes and Observations.**—pp. viii+152. With 6 figs. (4 maps). 1931. London: John Bale, Sons & Danielsson, Ltd., 83–91, Great Titchfield Street, W.1. [7s. 6d.] [Review appears also in *Bulletin of Hygiene.*]

"Climate and Acclimatization" is not a book that can be reviewed by merely reading the preface and glancing through the text, for when once opened it will hold the reader from cover to cover.

The book is divided into three chapters entitled "Climate," "Effects of Climate" and "Pressure." There are several good diagrams and at the end a most valuable list of references has been compiled. After classifying climates in a tabulated form the author goes on to show the effect of each on man, animals and vegetation, and an interesting map illustrates their relationship to the output of human energy.

The second chapter is perhaps the most interesting in the book and in it the effect of climate on the various systems of the body is carefully and systematically analysed and reference is made to past and recent work on this subject. When dealing with the heat regulation of the body the importance of the part played by the evaporation of invisible sweat rather than that of the water secreted is strongly emphasized. The various means of investigating the body temperature are described and the fallacy of placing a thermometer for half a minute in a perspiring axilla is pointed out, though the author states that in a dry and well-closed axilla the temperature will nearly always approach that of the mouth. A note of warning is sounded on the dangers of constipation in tropical climates with a low humidity and the necessity of a daily intake of water to combat the loss of moisture from the skin is stressed.

When speaking of the effects of climate on the nervous system, "tropical irritability," a syndrome sometimes found among senior members of the fighting services, is discussed, and while one associates this with hot climates it is interesting to note that a similar condition even approaching "tropical fury" is often found in cold and mountainous countries where the air is surcharged with electricity. This section of the book ends with an excellent description of the pathological conditions caused by high atmospheric temperature and humidity exemplified by heat stroke and heat exhaustion. A résumé of the experimental work on the causation of heat stroke is first given, after which its aetiology, symptomatology and treatment are discussed, while heat exhaustion is dealt with clearly and concisely.

The last chapter deals with pressure, the causation of wind, and acclimatization, and finishes with some very useful advice for those about to live in the tropics.

In "Climate and Acclimatization" Sir Aldo Castellani has produced a book which is not only of real scientific value but one which, on account of its clarity and simplicity of style, will be found most interesting by the layman.

G. S. Parkinson.

WOLTER (Friedrich). **Die Malaria in Russland in ihrer Abhängigkeit von Boden und Klima. Ein epidemiologischen Kommentar zu dem der Malaria-Kommission des Völkerbundes im Jahre 1924 erstatteten Bericht von Dr. I. A. Dobreitzer : "Le paludisme en Russie de Sovjets."** [Malaria in Russia: Its Dependance on Soil and Climate.]—*Pettenkofer-Gedenkschrift.* 1930. Vol. 11. 56 pp. With 1 coloured plate. [5 refs.] Munich: J. F. Lehmann.

The author, an enthusiastic disciple of PETTENKOFER, considers that the history of malaria in Russia since the war signally illustrates the truth of PETTENKOFER's fundamental doctrine of the importance of a soil factor. Briefly, the doctrine is this: that putrefactive changes in the soil are an essential factor of the epidemicity of various diseases, particularly cholera, the typhoid group, malaria. A declining level of the sub-soil water will be an *index* of this (as PETTENKOFER himself said—" Looked at by itself and for its own sake, the condition of the sub-soil water has as little significance as the hands and dial of a watch dissociated in thought from the works to which they belong "). When this condition is fulfilled and at the same time the general drainage and cultivation of the soil are neglected, epidemics will be generated. The author, taking the data provided by DOBREITZER, shows a correlation in time between increasing or decreasing malaria prevalence in Russia and falling or rising level of the sub-soil water. He accounts for the enormous increase between 1921 and 1925, during a period of falling sub-soil water, by the breakdown of organization and consequent neglect of soil culture and drainage consequent upon the civil wars. He considers that the contrasting experiences of the French and the Americans in Panama are best explained in terms of PETTENKOFER's doctrine. The French period of failure corresponded to an epoch of falling sub-soil water. The Americans were not only active in a more favourable period but, over and above specific anti-malarial measures, systematically carried out drainage operations. He points out that pneumonia, dysentery and typhoid declined under their régime as dramatically as malaria. An examination of the history of malaria in Italy and the Ems lowlands leads him to the same conclusion.

[Although there is some exaggeration and a rather light-hearted acceptance of what seem to the abstractor very sketchy statistical data—the table on pp. 21–22 may be instanced—in this monograph, it is a serious contribution to its subject. A point of view is presented which is worthy of consideration.]

M. Greenwood.